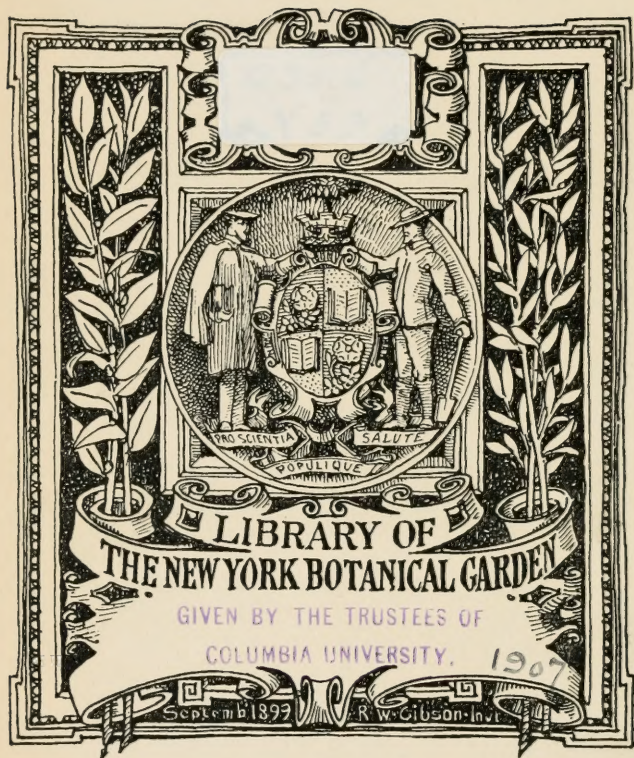






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TWENTY-SIXTH ANNUAL REPORT

TO HIS EXCELLENCY,
C. J. BELL, GOVERNOR OF VERMONT

—

Bray

IN COMPLIANCE WITH SECTION 247, CHAPTER 21 OF THE
GENERAL LAWS OF VERMONT, I HAVE THE HONOR TO
SUBMIT HEREWITH THE ANNUAL REPORT OF
THE BOARD OF AGRICULTURE FOR THE
YEAR ENDING JUNE 30TH, 1906.

—

GEORGE AITKEN, Secretary

—



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REPORT OF THE SECRETARY OF THE BOARD OF AGRICULTURE.

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To C. J. BELL, Governor:—

Sir: I have the honor herewith to submit this my second annual report of the Board of Agriculture for the year ending June 30, 1906.

The board held 38 meetings during the winter months, of two and sometimes three sessions, in addition to those places reached by the better farming trains.

Agriculture in all its branches was discussed at these meetings, by experts in their several lines, and it is gratifying to be able to state that the interest in scientific agriculture is rapidly increasing.

Nowhere was this more noticeable than in the progress through the eastern part of the State of the "Better Farming Train," which in the opinion of the board was a decided success, and it is to be hoped that the good work accomplished in this line will be continued.

The board was ably assisted by Dr. J. L. Hills, of Vermont Experiment Station, B. Walker McKean, secretary of the State Board of Agriculture of Maine; Prof. L. R. Jones of Vermont Experiment Station, Prof. Stuart of Vermont Experiment Station, Hon. C. W. Winslow of Brandon, E. P. Mayo of Waterville, Me., Prof. F. S. Cooley of the Massachusetts Agricultural College, Amherst, Mass., Arthur M. Vaughan and Homer W. Vail of Randolph, Vt., Cassius Peck, superintendent of Experiment Farm, Burlington, Vt., Prof. B. E. Fernow, Ithaca, N. Y., Dr. H. D. Holton, secretary State Board of Health, Mason S. Stone, superintendent of education.

His Excellency, the Governor, attended a good many of these meetings and was enthusiastically received and his remarks fully appreciated.

This has been a very prosperous year along all lines of agricultural industry and farmers are rapidly coming to realize that with the aid of modern machinery and scientific methods their lines are cast in pleasant places.

The edition of the illustrated pamphlet "Vermont 1905" has been exhausted and the results from this publication have been so encouraging as to warrant the publication of a better one for 1906, which will shortly be issued.

GEORGE AITKEN, Secretary.

SEP 23 1907

EXPENSES OF THE BOARD OF AGRICULTURE.

From July 1st, 1905, to July 1st, 1906.

George Aitken:		
Services	\$426	00
Expenses	171	07
	—	\$ 590 07
Ernest Hitchcock:		
Services	\$192	00
Expenses	148	18
	—	\$ 340 18
Dana H. Morse:		
Services	\$196	00
Expenses	134	41
	—	\$ 330 41
Cassius Peck:		
Services	\$ 20	00
Expenses	15	34
	—	\$ 35 34
L. R. Jones:		
Services	\$ 24	00
Expenses	27	23
	—	\$ 51 23
B. Walker McKeen:		
Services	\$120	00
Expenses	74	78
	—	\$ 194 78
C. H. Winslow:		
Services	\$ 8	00
Expenses	5	90
	—	\$ 13 90
F. S. Cooley:		
Services	\$ 60	00
Expenses	35	32
	—	\$ 95 32
E. P. Mayo:		
Services	\$ 48	00
Expenses	36	63
	—	\$ 84 63

Arthur M. Vaughan:

Services	\$ 28 00	
Expenses	20 77	
	<u> </u>	\$ 48 77

Homer W. Vail:

Services	\$ 44 00	
Expenses	28 08	
	<u> </u>	\$ 72 08

J. L. Hills:

Services	\$ 80 00	
Expenses	55 08	
	<u> </u>	\$ 135 08

Henry D. Holton:

Expenses		30 06
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C. S. Phelps:

Institute work		30 00
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B. E. Fernow:

Institute work and Forestry meeting....		52 00
	<u> </u>	\$2,103 85

MISCELLANEOUS.

Livery Bills and other expenses for the Board..	\$ 72 00	
Telegraph, Telephone and Postage	91 45	
Express and Freight, receiving and distributing reports and Vermonts	107 10	
Advertising meetings and institutes	42 90	
Stationery, printing and paper	11 73	
Tuttle & Co., printing	2 00	
Brown & Moore, printing posters, hand bills and programs	91 50	
Expenses of the Better Farming during the year	307 81	
	<u> </u>	\$ 726 49
		<u> </u>
		\$2,830 34

AN IDEAL AGRICULTURAL FAIR.

ADDRESS DELIVERED BY E. P. MAYO AT A FARMERS' INSTITUTION.

I have been invited by your worthy Secretary to visit the Green Mountain State and tell of a fair held in the State of Maine, the State that abounds in fairs, in the hope that the good State of Vermont would take courage and have one modern State Fair in which every part of the commonwealth would have a share and be interested in its success. The success of the Central Maine Fair, of which I am to speak, is all the more remarkable when it is known that it sprang up when there were already two old and thoroughly established exhibitions in the State, which would seem to encourage the people of this State in the belief that there is always room for one more—provided it is a good one, and thoroughly meets the wants of the people.

Agricultural fairs have been held in this country for nearly 100 years. The first was held in Pittsfield, Mass., in 1810, it having been inaugurated and practically operated under the patronage and encouragement of Elkanah Watson, a retired Albany, New York, merchant, who bought a large farm in the Berkshire Hills, where he retired to spend his closing days, but he was not satisfied to be simply a sojourner in the land, but seeing the need of it he desired to put agriculture on a better basis, and he could think of no better way to encourage the small farmers in that section to engage in agriculture and live stock industry on a wider plane than to inaugurate an agricultural fair, and it will interest all to know that the fair was a success from the start, and was the means of awakening an interest that never has died down in everything that pertains to agriculture in its widest sense. Since then there have been fairs and fairs, and there are over 50 held annually in the Pine Tree State, but notwithstanding this plethoric condition the feeling came to the good people of the far famed Kennebec valley, located in the central portion of the State, that they wanted and should have a modern and a model fair of their own. This feeling seemed to come to a large number of people, whose material interest center around the growing young city of Waterville, situated about equally distant from Lewiston and Bangor, where large State Fairs have been in

operation for a number of years. The city of Waterville is the center of a rich agricultural and stock growing region, and her people proposed to do business on their own hook, entirely independent of the larger exhibitions, but to outshine them in quality, even if the larger and older exhibitions exceeded them in quantity. As some one expressed it, it was to be a dainty little affair in a lace handkerchief.

Well, in the fall of 1903 a small but earnest party of kindred spirits met to talk the matter over. All were of one mind and the more ardent ones could hardly wait for the spring to open, that operations might commence. When a name was suggested for the new baby, "Central Maine Fair Association" was the exclamation of all, and so it went.

A new trolley line had just been constructed, connecting Waterville with the thriving village of Oakland, and midway between the two a half mile race track and athletic grounds had been constructed. The railway project was in the hands of enterprising, wide awake business men, who were not slow to see an opportunity to boom the traffic on their road. No sooner was the Central Maine Fair organized than a lease was taken of the race track grounds, and the lease included the erection of generous sized buildings, ample in number to house a great fair, should the humble beginning ever grow to that magnitude.

Well, at the first meeting of the directors of the new organization, the question of the limits of the territory of the fair aroused a very heated and long continued discussion, which resulted in making our tiny unique little fair, as proposed, a great State affair, covering and calling for exhibits from the sixteen counties of the State, and the new born infant instantly became of necessity a rival to its older brothers, 50 miles distant, east and west. We were facing a condition and not a theory, but the expansion had a wonderful effect upon all concerned. They said they did not want a baby fair, but a full grown exhibition, and went to work with heart and hand to make it.

Substantial buildings, with all modern improvements sprang up as by magic, and the baby began to grow. Early in the enterprise it was announced as one of the cardinal principles of the undertaking that the Central Maine was to be a clean, aggressive exhibition, from the start to the finish. The promoters were told that the people who patronized fairs had determined the kind of a fair they wanted, and any decided innovation would not meet with public favor—in other words they were told that the public did not want an agricultural exhibition too clean and quiet, that a little disorder and noise were necessary to make it appetizing and attractive to the masses, meaning

that the lower element should be catered to, and the better class let severely alone. This was precisely what the management proceeded not to do. The best people in the community, the pastors of the churches, and the "four hundred" were asked for their help and suggestions. The sabbath schools were offered free use of the grounds and buildings for their annual picnics. The grounds were kept neat and tidy at all times, and flower beds were planted and kept in order, a handsomely constructed driveway encircling the grounds was kept open for public use, but the race track and athletic grounds were kept closed on Sunday, and although a little kick was made at the start, the act was fully approved of, especially by the hard working horsemen. All these overtures were met in the most cordial manner, and all the best and highest interests of the community were thoroughly aroused as the word was given out that the new fair was to be clean and healthy from core to circumference.

So thoroughly were the ladies interested that the local Woman's Clubs offered their services in taking charge of an Arts and Crafts and kindergarten exhibit in the big coliseum, which by the way, is the largest exhibition building of its kind in New England, being 175 by 100 feet in size. Of course their services were heartily accepted, and then and there the future destiny of this fair was settled and determined. The idle drivels about petticoat sovereignty and Sunday School horse trots was drowned out by the onward and upward progress of the fair. A clean fair was the watchword, and even the men who formerly had made a business of polluting fairs, caught up the refrain, and sang it to the echo. It sounded good on the air, and was refreshing and cheering to all.

If it was to be a clean fair, all connected with it must be clean. The cattle exhibit, the races, the men who cared for the stock, the entertainments, and even the so-called fakirs. Here came the rub. The wise ones said it was easy to talk, but when the fair opened it would be the old, old story, and the Central Maine would be like all the rest. We had at our exhibition in 1905, 30,000 people present on Governor's Day, and among our honored guests was our own chief executive, also the executives from the good States of North Carolina and Vermont. Both of these distinguished visitors expressed their great surprise at what they beheld, for although the grounds were thronged with pleasure seeking people, not an arrest was made all day, nor during the night, when the grounds and track, brilliantly lighted, held a large concourse of delighted people, far into the night. Not even the slightest accident, not a loud, profane, vulgar, or insinuating remark from all the fakirs, assembled from the four quarters of

the globe. Not an ungentlemanly remark disturbed the quiet of those enjoying the very exciting races.

I have said that it was a unique fair, both in exhibitions, and in the entertainment afforded, and when I say that the old threadbare vaudeville stage show was dispensed with you will probably believe it. But, I hear some one asking how the crowd was entertained between heats during the races. Well, they witnessed 35 separate and distinct acts on the track, in a single afternoon, with plenty of music by one of the finest bands in the State, in addition to the various heats of three hot races. And it goes without saying, there was not a dull moment the whole afternoon. These acts consisted of chariot races, with four live running horses hitched to each chariot, encircling the track at a breakneck speed. Then there were various kinds of running races, fancy hitches, imitating the more elaborate horse shows, show of fine stock to halter, etc. etc., not forgetting an exhibition of a horse showing almost human intelligence.

All the cattle shown in the judging ring had to be clean to the last degree, and no animal that was neglected in this respect could face the judges. This one item, simple in itself, went a great ways in making the general effect of the exhibition pleasing and attractive to the visitor. The ladies, of course, did their part to perfection, and when the doors of the coliseum were thrown open, the interior presented a bower of beauty. It is not necessary to recite that the fruits, vegetables, and agricultural implements were not in the least neglected, and last, but by no means least, the exhibition by the several subordinate Granges in the community shown in a gigantic building, drew together the finest exhibits of their kind ever seen at any fair in any State. The poultry show was also declared to be the largest and most successful of any fall show ever given in our State.

Do not think for a moment that the cleanliness and order that I have tried to portray, displeased in any degree, the element to which agricultural fairs are too often prone to cater. Not a bit of it. That very element was pleased and proud to have even the most humble part in an exhibition where such conditions prevailed. And at an annual meeting, when the word was given out that a new set of officers would give a different kind of an exhibition, these very parties were the first to protest. "We want it as it has been; we want a fair that we are not ashamed to have our wives and daughters visit and inspect every part of it." And so it goes. The fair of 1905 was conceded to be the most complete and best all 'round agricultural exhibition ever held in New England, and the word has already

gone out that the fair of 1906 must be along the same high plane, but if possible more complete and comprehensive.

Agricultural fairs of the future must surely take their cue, if they would prosper, from this unique, modern and model fair, both in ways of cleanliness and progressiveness.

EDWARD P. MAYO.

DAIRYING IN VERMONT.

While Vermont is capable of producing more and better butter per acre than any other of the New England States, owing to her shady and well watered hill pastures, her sweet and nutritious grasses, early cut and well cured, her large acreage of forage crops, including the corn crops used almost exclusively for the silage, while all these natural advantages pervade Vermont throughout, yet there are some things, some practices prevalent among Vermont dairymen that ought and must be eliminated before these natural advantages can be made to avail us their best results.

Argument upon argument has been made, rule after rule has been laid down by our institute workers how to breed and care for the dairy cow,—how to weed out cow-boarders and establish the three hundred pound herd,—how cleanliness is indispensable from the udder to the churn, how to preserve cream and milk in its best form for making a first-class product, be it either for the sale of sweet cream or milk, to make butter or cheese. And, after all this hammering and pounding, I believe is safe to say, that but a small percent of our cream and milk reach the factory or its market in condition for making a first-class product.

In many, alas too many cases of private dairying, the lack of care and attention in handling the milk and cream prevails, and I cannot pass the point without saying that these seeming small neglects, make all the difference between profit and loss, success and failure in the dairying. No butter or cheese maker can make a good article out of the tainted milk or cream, and hence comes in a low price, and little or no profit for the dairy product. Your early cut clover, your corn ensilage, your output for concentrated feeds, the sweet grasses of your pastures are all scaled down in profit to poor house conditions.

Another quite as discouraging and unjust feature of carrying poor milk to our butter factories, is the effect upon such patrons as are pains-taking and furnish a good quality of goods the entire year around. The poor grade may be less even than the larger portion of the product going to the same factory, but

the whole is "leavened" by the low grade, and the profit of the good as well as the bad is lost to the producer.

Again, dairymen are punished by reason of this slothful way of handling their milk. It puts us in competition with our own production, the poor against the good in butter markets, and consequently cheapens the price of both grades. Farmers complain of hard times, while the fault lies at their own door. We can and should control our own and legitimate affairs.

The interest of every butter or cheese factory, whether proprietary or co-operative, in our grand old State are identical,—hence there is no reason for this state of affairs to longer exist. Let us unite upon the common and sensible basis of rejecting every pound of second class cream or milk furnished by the patron, be he great or small, rich or poor, high or low, and we shall have a remedy for this evil,—a handicap that renders dairying discouraging and disgusting.

One more point which seems to me entirely under the control of the dairyman, if he would unite his efforts with his brother farmer,—namely that of marketing our dairy products. Much is said and written upon the large quantity and fine quality of one should produce per cow, as though that was the acme of all true ambition, leaving out all suggestions as to how to profitably dispose of or market the product of our dairies.

Unity of action ought or should be the watchword all along the line among farmers of today. Is it not possible for farmers of Vermont to unite to such an extent as to establish a market under their own supervision, and in their own New England markets? It seems clear to me that such a scheme is feasible as well as reasonable. As it is, our butter factories in Vermont are competing one with another, and one dairyman against another, each one trying to undersell his neighbor. Is such a plan wise? If so, why do not merchants and other business men adopt the scheme? Will farmers thus continue in such a destructive course? Why not work together in establishing a market for our choice dairy products and thereby realize something of the fruits of our labors, and the rich harvests of our fertile fields?

DANA H. MORSE,
Randolph, Vt.

CHEMICAL WEED KILLERS OR HERBICIDES.

L. R. JONES, BOTANICAL DEPARTMENT, VERMONT EXPERIMENT STATION.

It should be emphasized at the outset that the use of chemicals as herbicides offers no specific cure-all against weediness. Cultivation, short rotations, watchfulness against the introduction and scattering of weed seeds are all of more fundamental importance than chemicals in combating weeds. There are however, various cases where chemicals intelligently used are more expeditious and economical than any other means for weed killing. A practical difficulty is so to use the herbicide as to kill the obnoxious plants without working permanent injury to the soil or to neighboring cultivated plants. This difficulty limits the chief usefulness of chemicals as weed killers to the following cases:

1. Where an especially obnoxious weed, like poison ivy, occurs in a limited locality and is to be destroyed regardless of consequences to soil or neighboring plants.

2. Where the aim is to render the soil permanently sterile as in roadways, tennis courts, etc.

3. Where the weed plant, as orange hawkweed, is much more sensitive than the associated useful plants to the action of some herbicide.

CHEMICALS USEFUL AS HERBICIDES.

Any soluble chemical, even including the various commercial fertilizers, if used in sufficient amount, will kill plants. Some act directly and quickly as poisons, e. g., arsenic and carbolic acid; others, such as salt, have little or no directly poisonous effect but kill the plants primarily by drawing the water from the tender foliage, or by so holding the moisture of the soil that it cannot be absorbed by the roots. It is important in this connection to note that in either case the herbicide is most effective on young plants that are in active growth. Effectiveness in one or the other of these ways, together with cheapness

and convenience of application, are the things to determine choice among the various compounds available. Without attempting to list all of these, we include those whose worth has been best established by trial.

Salt. (Sodium chloride). This is probably more commonly used than any other compound, chiefly because of cheapness and handiness. Its action depends almost wholly upon the withdrawal and retention of moisture from the plant, therefore it should be applied dry or in strong solution, and it is most effective in hot, dry weather. Salt can be used in any weed killing operation, but is most valuable on roadways, etc., and for certain lawn weeds.

Blue vitriol. (Copper sulphate). This is more powerful in herbicidal action than salt, but its cost prohibits its general use. For most purposes it is best used in solution, from 2 to 10 percent being efficient. It is often used on gravel walks, etc., but salt will generally be found cheaper and arsenical poisons more efficient. Its chief value is against charlock, as noted below.

Kerosene, Petroleum oils. Kerosene and other coal oil products will kill plants. On account of handiness it is frequently used, but it is weak in efficiency and relatively more costly than any other chemical here listed. A pint of crude carbolic acid will do much better service than two gallons of kerosene, and cost much less. Gasoline is more effective than kerosene in some cases. When crude petroleum is available at a very low price it is commended.

Carbolic acid. This is one of the quickest and most valuable herbicides. The crude acid is relatively cheap. It is not quite equal to the arsenical poisons for penetrating the soil or in lasting effects but is often preferable on account of cost or convenience. It does not corrode metals, hence may be applied with any can or pump. An effective method is to squirt the strong acid from an ordinary oil can upon the roots or crown of individual weeds. If to be sprayed or sprinkled broadcast on the foliage or ground it should be diluted with from 15 to 30 parts of water, and this mixture agitated frequently during use.

Sulfuric acid. (Oil of vitriol). This is, of course, destructive to everything it touches. It can be applied in the crown or about the roots of coarse or especially hardy plants, providing one is willing to kill the adjacent vegetation also. In general, carbolic acid will be preferred, partly because sulfuric acid can be handled only in glass vessels.

Caustic soda. A strong solution of this makes a cheap and effective herbicide, commended especially for pouring on soil where it is desired to destroy poison ivy or other deep rooted

or woody plants. Of course, soil so treated will be rendered sterile for some time, but the soda will gradually leach away. Like salt, this is most effective if applied in hot, dry weather.

Arsenical compounds. One or another of the soluble arsenical compounds form the most effective herbicides known. These form the basis of all of the various proprietary "herbicides" or "weed killers" that we have analyzed. Such compounds are handled by leading horticultural supply houses, and, so far as we have tested them, are highly efficient. The only reason for seeking elsewhere is their high price. Soluble arsenical poisons can, as a rule, be bought considerably cheaper in the drug trade and are similar in action. The simplest to employ is Arseniate of Soda. This needs only to be dissolved in water for use (at rate of 1 pound dissolved in 3 to 9 gallons of water). White arsenic is still cheaper, but according to Schutt's formula, which we have used, it must be combined with sal soda, which is somewhat of a bother. (White arsenic, 1 pound; washing soda, 2 pounds; water, 3 to 9 gallons). An important characteristic of these arsenical poisons is that they endure for a long time and do not readily wash or leach away. For this reason they are the most useful herbicides to use on roadways, etc., as explained below.

MORE SPECIFIC DIRECTIONS FOR USE.

Any of the above chemicals will kill any plant if applied directly to it in sufficient amount. In addition to the more general advice included in the above account, the following specific directions are adapted to special cases.

Gravel roadways, gutters, tennis courts, etc., can be kept free from weedy growths by application of any of the above. If salt is used it should be scattered freely in the dry form. Caution is necessary where it is liable to be washed on to lawns, lest it damage the grass borders. Carbolic acid or arsenical poisons are preferable, both as less liable to wash and as more enduring in their action. One quart of crude carbolic acid in 8 gallons of water, or one pound of either arsenical compound mentioned above, in a like amount of water will suffice to cover a square rod or more of surface, and one, or, at most, two applications per year suffice.

Charlock, known also as kale or wild mustard (*Brassica Sinapistrum*) is easily destroyed in oat, wheat, or other grain fields, by spraying with a solution of 1 pound of copper sulphate in 4 to 6 gallons of water (2 to 3 percent solution). A force pump should be used, supplied with fine nozzles. The treatment is most effectively made when the grain is 3 to 6 inches tall, since at this stage the large charlock leaves spreading above the

grain are easily covered by the spray. One barrel or less of the solution (30 to 50 gallons) suffices to cover an acre and destroy the charlock, and this amount causes little or no damage to the grain. This same treatment is reported to be more or less effective against a variety of other weeds, including thistles, penny-cress, ragweed, lamb's quarters, etc. The wild turnip (*Brassica campestris*) and some allied cruciferous weeds are less easily killed because the spray does not adhere to their smooth leaves.

Lawn weeds. Orange Hawkweed (*Hieracium aurantiacum*), chickweed (*Stellaria media*) and some other of the shallow-rooted succulent weeds of lawns and grass lands can be more effectively combated by the use of salt than any other chemical. Fine, dry salt should be applied on a bright, hot, summer day (late June or early July best), broadcasting it so as to cover all plants uniformly, since it kills chiefly by drawing water from the leaves. From 1 to 4 quarts of salt can be used per square rod, with little or no permanent injury to the grass if upon a strong soil in the Northeastern States. Since the effect will doubtless vary much with local conditions, anyone trying this should make advance trials on a small scale. Following the application, the dead weeds should be raked out and a liberal application of grass seed made. A liberal seeding with white clover will help to keep such weeds out.

Poison ivy and similar woody rooted pests can be eradicated by cutting off the tops in hot, dry weather in midsummer and pouring a saturated solution of caustic soda about the roots. The arsenical solutions mentioned above can be used, but are generally objectionable because they render the soil sterile for so long a period thereafter.

GRASS PROBLEMS WITH SOME SUGGESTIONS AS TO THEIR SOLUTION.

L. R. JONES, BOTANICAL DEPARTMENT, VERMONT EXPERIMENT STATION.

Probably three-fourths of the cleared land of New England is given over to grass and clover culture. Both the climatic and soil conditions of this section are peculiarly suited to the growth of grass and the agricultural reputation of New England is largely based upon this fact. Nature has here given a wider variety and more luxuriant growth of valuable natural grasses than in any other like area in the United States. In the earlier days with virgin soil little more was needed to secure rich pastures and meadows than to give the natural grasses a chance by clearing the land. With the gradual depletion of the soil we are forced more and more to come to nature's aid. In other words we are each year in New England being led to see our grass problems more clearly defined. I will try to outline some of the grass problems as I see them with suggestions as to their solution. These will be only suggestions, however, for each man's problems in this, as in other lines, are more or less his own and must be solved somewhat individually.

LEARN TO KNOW THE VALUABLE GRASSES.

The first thing clearly to recognize is that although we handle the clovers and grasses as one crop and popularly call both "grasses," they are fundamentally different and must be handled differently. Moreover, there are many different kinds of the true grasses as well as of the clovers, each with its own peculiarities. In Vermont we have no less than 130 true grasses growing naturally or introduced in cultivation. Everyone of these true grasses forms palatable and nutritious food for stock at some stage of its growth. Many of these are rare woodland and mountain species, but more than a dozen of them occur commonly in pastures and meadows. The first step toward the solution of the grass problems is for each man to learn to recognize as many of these as grow on his own farm and distinguish

their respective merits. In addition, there are at least five clovers of which the merits should be clearly understood.

I have selected fifteen of the most important grasses and clovers which I know to be common in this State and have grouped them below for convenience in three groups of five each. No mention is made of quack grass in this list or its subsequent discussion. It is assumed that everyone knows the grass and recognizes its merits for fodder, both in meadow and pasture. The trouble is that we sometimes wish to use the land for some other crop.

LIST OF VALUABLE VERMONT GRASSES AND CLOVERS.

Five grasses of wet lowlands, meadows and pastures.

- Reed canary grass,
- Rice cut-grass,
- Blue joint,
- Fowl meadow grass,
- Red top.

Five upland meadow and pasture grasses.

- Timothy or Herd's grass,
- Meadow fescue,
- Orchard grass,
- Kentucky blue grass or June grass,
- Canadian blue grass.

Five clovers.

- White clover,
- Common red clover,
- Mammoth red clover,
- Alsike clover,
- Alfalfa.

THE PROBLEM OF THE WET LANDS.

These are the richest of soils and peculiarly suited to grasses. The only trouble is too much water. If they can be drained that is the direct way to the solution of the problem. Often this is impracticable. If so we should recognize at once the fact that, according to nature's laws, the upland grasses and clovers, especially timothy and red clover, cannot live in wet soils and not waste time and seed in trying to make them. Nature has given us excellent wet land grasses—some adapted to one soil, some to another. The best way to learn what these are is to observe what ones grow there naturally. If there is much standing water it may be Reed canary; if an old pond bed it may be the rice cut-grass; if deep black muck it may be the blue joint; if subject

to spring overflow the fowl meadow may predominate; while red top comes in naturally in soils a little too wet for timothy. If clover is a possibility remember that alsike will stand much colder, wetter soil than red.

Remember also that all of the above are true grasses—all sweet and nutritious, making hay equal in value to good upland hay if cut early. Too often these true grasses are confused with the sedges—often wrongly called “marsh grasses” or “swale grasses.” The latter are not true grasses and it is an unfortunate thing that they are so commonly confused with them since the sedges are, without exception, almost worthless agriculturally, whereas the true grasses, even from wet land, all have high value. It is especially important, therefore, to learn to distinguish them. This is easily done with a little careful observation from the fact that the sedges have harsher leaves, generally, with saw toothed edges and with *solid, triangular*, stems, while the true grasses all have *hollow, cylindrical* stems.

The solution of this problem for each man is, therefore, to learn what of these true grasses nature has planted in his wet land and prize them at their real worth. If he plows such land he should leave such parts as are occupied by these grasses and aim, by scattering seed or sod of these and other natural wet land grasses, to encourage their growth.

Blue joint is the best of these on very wet soil, a very heavy yielder and the best of hay if cut early.

Rice cut-grass is so nutritious that I have known of its use for horses as a sufficient feed with no grain whatever.

Fowl meadow and *red top* are the easiest to handle by the use of seed, starting quickly and giving a full stand of long lived grasses.

THE PROBLEM OF THE PASTURES.

This is in some ways the knottiest of all New England farm problems. The first thing to do is to recognize friends and foes. There are six grasses and clovers of preeminent value for use in New England pastures. These are:

1. White clover.
2. Kentucky blue grass or June grass.
3. Canadian blue grass.
4. Red top.
5. Orchard grass.
6. Meadow fescue.

Each of these is a long-lived nutritious pasture plant, some doing better in one situation, some in another. Probably the

first five are found on every long-tilled farm in Vermont and meadow fescue is at least much commoner than is popularly supposed.

For the practical solution of the pasture problem the following suggestions are given.

First. Recognize frankly that much of the so-called "pasture" should henceforth be called "wood-lot." Fence it off and encourage it to grow up to forest. Growing white pine is one of the best long time investments that can be made, and in many cases it should not only be allowed to grow but encouraged by seeding and planting. It is amazing how quickly it will double and quadruple in value. Good pine land will grow over 40 cords or 20 thousand feet in 40 years, and the increase in value will be even greater after that. Recently, I knew of 8 acres of second growth pine in the Connecticut valley, Vermont, to sell for over \$8,500. With the increasing value of pine lumber what better crop can be grown? The deliberate conversion of much of the weediest, roughest old pasture lands to wood-lots will go far toward the right solution of the pasture problem.

Second. Rarely plow up an old pasture sod providing your aim is to keep it in pasture. Instead realize that the best way to keep down weeds and at the same time add to the fertility of the soil is to stock heavily, if need be, supplementing the pasture feed by a soiling crop and a little grain.

Third. Renovate the pastures as needed by working fertilizer and seed in from the top in early spring or in late summer. Top dress with manure or ashes where practicable. If the stand needs thickening in places run over these with a harrow in early spring or about the first of August and seed with the following mixture:

Timothy	10 pounds
White clover	5 pounds
Kentucky blue grass	10 pounds
Red top	5 pounds

Add 3 pounds of each Orchard grass, Canadian blue grass and Meadow fescue if good seed of these is obtainable.

THE PROBLEM OF THE MEADOWS.

In working out the problems of the best handling of the meadow lands, the first thing is clearly to define the conditions and aims in each case. If it is low, heavy land naturally suited to grass and handled with difficulty for other crops, it is best to lay it down with the idea of leaving it many years. In this case something like the following mixture should be used, the

relative amounts of red top and alsike being increased or decreased, according to amount of water in the soil:

Timothy	10 pounds
Red top	4 pounds
Red clover	5 pounds
Alsike clover	5 pounds

This mixture gives a prompt stand of the best quality and in addition, the alsike clover endures longer than the red clover; and the red top, while not making much of a showing for the first three years, comes in thereafter when the shorter lived plants yield and thus insures a longerlived and heavier stand than timothy and clover alone.

If, however, it is loamy upland suitable for a variety of crops then, unquestionably, the highest degree of success is secured by shorter rotations. If a three to five year rotation can be practiced the weed problems are solved, clovers are increasingly successful and the general fertility of the land rapidly increased.

In this case, the red top should be omitted, the seed mixture then should consist of about the following, the relative amounts of red and alsike clover varying according to local experience:

Timothy	16 pounds
Red clover	7 pounds
Alsike clover	3 pounds

And, finally, there is the clover problem. The highest success in dairy farming, in Vermont at least, is directly conditioned upon success with the corn and clover crops. Many men who succeed with corn, timothy and red top fail to secure the best results with clover. While there are several other factors entering into this clover problem, I would lay especial emphasis upon two. The first is seed. There is clover seed and clover seed—it comes from west, east, north and south, and varies accordingly in vitality and adaptability to our conditions as well as in purity. There is, however, plenty of excellent northern-grown seed in the market and the wise man will always insist on having the best of this. Of course he expects to pay well for it—but what is a matter of a couple cents a pound, more or less, as compared with the highest success or partial failure in the resultant crop.

The other matter to be borne clearly in mind in preparing the ground for clover is that to succeed with clover two kinds of plants must be cultivated—the clover and the bacteria which are to inhabit their root-nodules. Without the help of the bacteria the highest success cannot be obtained, for it is these which supply the clover with nitrogen. Although we can only see

these germs with the most powerful microscopes we have learned to recognize in them real plants which require for their life and helpful activity in the soil, tillage and drainage to remove water, admit air, decaying vegetable matter, to provide food and furnish uniform moisture, and finally sweetness as contrasted with acidity. It is surprising to one who has not tested it what a large proportion of the long cropped, old grass lands in New England are somewhat sour and success upon all such soils must be conditioned upon first correcting this acidity. For this purpose a liberal dressing of lime or better ashes—which furnish both potash and lime—is called for.

THE STORY OF THE SUGAR MAPLE.

AS TOLD BY MR. J. A. CHAPIN, A PROMINENT SUGAR MAKER OF
MIDDLESEX, VT.

The following paper was read at last year's meeting of the Vermont Botanical Club. It is of more than passing interest, not only because of its timely suggestions of the secrets of the sugar woods, but as embodying the results of exact studies into the rate of development of these veterans of the primeval forest which are so rapidly disappearing in Vermont.

THE STORY OF A MAPLE TREE.

This is the story of a sugar maple tree for the last 200 or 225 years—a true story and to me an interesting one—as the tree has recorded it. I cannot tell it as well. It is also not only the story of one maple tree but of tens of thousands of its brothers all over the good old State of Vermont. And, further, it is not alone the history of these maple trees, but of their human neighbors, the people that have lived among them and loved them from generation to generation, the pioneer woodmen that spared them in the first cutting and clearing of the new state; their sons that protected them and harvested their bountiful products; their grandsons, who, with the benefit of modern knowledge and its application, have come to appreciate more fully their intrinsic value in many ways.

My attention was first forcibly called to the fact that a maple tree could of itself tell a most wonderful story, while sawing a wood pile the past winter. I had cut down several large maples that had survived their usefulness for sugar-making, and in sawing them for wood, I cut from the butt of one medium-sized maple a round cross-sectional block about 3 inches long and in size the diameter of the tree.

This block was of such a height in the tree (3 or 4 feet from the ground) that it disclosed very plainly the tapping marks of the past 100 or more years, and their results on the tree, and of course, also the annual rings showing the age of the tree. I am sorry that the weight of this block prevented my showing

it here to illustrate my statement. It speaks very plainly for itself.

By counting these annual rings I found that the tree was 200 to 225 years old; that in A. D. 1700 or before, it had begun its life and was standing in the same place where its stump now stands. As many of its neighbors were larger and older than this individual tree, some of them were doubtless standing as small saplings when Samuel Champlain first sailed up this beautiful lake that bears his name. I find that the sun was broadening its leaves and lengthening its branches long before the first settlement of the State at Fort Dummer in 1724; that it was a sturdy sapling when the French and Indians were trailing up and down the Winooski River on their way to and from their raids and massacres at Deerfield, Casco Bay, etc. Its lower branches must have been too high for a moose to browse twenty-five years before Ethan Allen was born; and when that father of Vermont independence first saw the light, my tree must have been thirty feet tall or more and 8 or 10 inches in diameter. At the time of the Revolutionary War it must have arrived at very stately proportions.

Standing in the virgin forest it must of necessity have reached its trunk up very high to meet the sun, which all its neighbors were crowding up for, so it must have been at this time 50 or 60 feet tall and straight and comely. It had little to contend against save a rigorous climate and the encroachment of other trees.

Wild beasts may have sought safety in its lofty branches, and bees may have stored honey in its hollows; but these were mere incidents in its history. It had yet to deal with the white man.

The Indian on his trails up and down the winding Winooski had little time to turn aside and pursue the gentle art of sugar-making, but the dusky squaw, if she accompanied him on that hunting or fighting trip, when the sun was warm in the spring-time, may have been tempted to use the hatchet on my maple or some of its neighbors, and to evaporate its sweet water by the tedious process of dropping heated stones in it. Who can say?

But about 1790 to 1800 this tree comes in contact with the pioneer settlers of central Vermont. By the axe-marks in my sectional block I find that it is now a tree 14 or 15 inches in diameter. From this time on until the present day, the history of this tree is written in its own rocky fibre in enduring characters.

In fact, the period from this time on, covers its sugar-making epoch. I need not take the space to tell how for many years it was tapped annually with an axe; how great cuts were made

in its sides, the marks of which are now covered by 8 or 10 inches of solid wood; how the sap was boiled in potash kettles in the primeval forest; how the bear and catamount prowled around the sugar camp; how the children of 1805 liked "sugar on snow" just as well as the children of 1905; how ashes and firebrands falling in the boiling sap colored the sugar until it rivaled the kettles themselves in blackness. These facts are familiar to all Vermonters.

But with wonderful vitality the tree survived this axe-tapping, and then came a time of tapping with augers. My block shows where it was tapped repeatedly with an inch and a quarter auger. (I have in my collection slabs from neighboring sugar orchards showing where trees have been tapped twice or more with a two inch auger, and to a depth of four inches).

Then there are marks showing a time later on when a tapering instrument was used, I think what was called a pod-auger.

The foregoing scars covered a space of fifty or sixty years, and then came a time when it was concluded that a smaller bore would produce as much sap and with less injury to the tree.

From a $\frac{3}{4}$ inch bit, the size was gradually reduced in twenty-five years to the 7-16 or $\frac{1}{2}$ inch style of tapping bit of today; and in the past forty years great strides have been made in the art of sugar-making, as well as in preserving the sugar maple tree.

About 1800, just before and shortly after, when the farms of Central Vermont were being cleared, thousands of these rock maple trees were cut and burned for the potash they contained; but thanks to the foresight of our forefathers, on nearly every farm some of the places where were the largest and best growths of maples, a section of timber would be reserved for a sugar orchard, and it is among, and only among, these old growths that we find the rock maple in all its primeval glory.

These rank, I think, as the largest botanical specimens in the State, and they are numerous and cover a large area.

Many are 10 and 11 feet in circumference at the base, some 12 and 13. These old growth maples tower above all other hard woods. Dr. Holmes says, "There is nothing holds its youth, so far as I know, but a tree and truth." And how many springs and summers this old tree had put forth its buds and leaves in all the freshness of youth and looked down on a changing world!

"Little of all we value here, wakes on the morn of its hundredth year,"—less on the morn of its two hundredth year. But this old maple tree stood on, hacked and scarred by man, and made to pay tribute year by year, yet, mighty still.

In summer's heat its cells expanded, its long arms reached out and upward in mighty strength. In winter's cold it braced its strong roots to withstand the fearful icy blasts. Through years, decades and generations it held its place. Firm on its native ledge it stood immune from fire and flood, giving of its stored up riches, spreading its shade for man and beast, asking no care of man, robbing nobody.

Mighty monarchs of the forest—pioneers of our grand old State—rockribbed as her eternal hills on which they stand—fit emblems of Vermont—more worthy a place on her shield than the pine—lofty, living monuments linking the past with the present—I love them.

J. A. CHAPIN.

Middlesex, Vt., March, 1906.

AN ANIMAL TO THE ACRE.

I wish to state as briefly as possible how the very desirable condition of soil production can be secured so that an animal may be kept for each acre of land cultivated. In doing this I shall be confined largely to my own experience upon our own farm.

For a long time the keeping of cows had been something of a specialty upon the farm, but no particular efforts were made to increase its stock carrying capacity. The farm was kept good by keeping back the bushes in the pastures and by small purchases of hard-wood ashes to apply when seeding the land to grass. The summer pasture consisted of a fifty acre upland lot, which in the early history of the farm had all been cultivated, but which was then trying hard to return to its natural condition, with clumps of pine seedlings continually appearing. The tillage land consisted of thirty-five acres of intervale, of a somewhat heavy clay soil. The intervale was devoted to the raising of hay, oats and hoed crops, the cows running in summer in the upland pasture, which was supplemented with grain and soil-ing crops, the young cattle being pastured away from the farm. Under this management, from ten to fifteen head of cattle and the farm team, were kept. This continued till about the year 1880. At this time efforts were made to increase the stock carrying capacity of the farm and to make it, in reality, a dairy farm. The pasture pines were rapidly increasing, its feeding ground was as rapidly decreasing, and this pasture problem appeared to be the first one that would have to be met and mastered. This problem was finally solved, as many of the worries of life may be disposed of, by abandoning it, giving it back to nature, whose hand, ever busy, has in the years since past, grown some sturdy pines, which I expect to live to see grow to the full size for a harvest, and which today make the land worth more per acre, than any other section of the farm, transforming what was formerly an eyesore and a nuisance into an object of beauty as well as of value. I may say, in passing, that possibly this may have a lesson for some Vermont farmer who may be using heroic but not wise efforts to keep some rocky hillside, or distant section of the farm, in pasture, instead of allowing, or possibly assisting, nature

in planting a crop of pine or other timber upon it that will, in time, bring up its value, and consequently the value of the farm.

Having abandoned our pasture, of course the next thing was to plan for something to take its place. To do this, and to facilitate the renovation of the farm, a five year rotation, with one year in pasture, was arranged. This rotation was, and has remained, as follows: Pasture, hoed crops, oats, land seeded to grass and clover, two years in grass. By this plan, the farm has had seven acres in pasture; seven acres in hoed crops, a portion of which were used for soiling, a portion for the silo, seven acres in oats, and fourteen acres in grass.

The portions of the hoed crops used for soiling have been as near the pasture as possible, mostly being fed there instead of being drawn to the barn, making a great saving of labor.

Under the former management of the farm, it took practically ten years to get across the field with the plow, the manure was put on a small area each year, and there was but little tillage with the plow or other implements. Under the new system the manure was put over double the area each year, by the use of a spreader. The land was plowed deeper and better, tillage implements were used oftener and more thoroughly. The gain in available fertility was rapid from the start. It came through several sources. First, the manure being spread over a larger area, and thoroughly fined by the spreader, gave quicker returns. Ten cords of manure per acre, applied once in five years, has proved to give at least twenty-five per cent. more net returns, than twenty cords applied once in ten years. The manure has been mixed with the soil by plowing a rolling furrow, and by cutting the soil deeply and finely, with disc, spring tooth and Acme.

Then next in importance, has come the more frequent and thorough plowing. I believe the plow is destined to play a very important part in the revival of New England agriculture. At present, we have too much land in old grass fields.

Our land has been plowed twice in each rotation, the old ground being plowed a little deeper than the land was broken, thereby turning up all the organic matter and deepening the soil slightly in each rotation.

The pasture helped much in adding fertility, the cows running practically all the time, in summer, on the land to be broken for hoed crops, the next season. The whole pasture area is fed over, leaving no waste places for the accumulation of weeds, and the manure from the soiling crops is evenly distributed by running a brush harrow over the pasture after a rain. By the larger area under the plow, the growing of corn, and the use of

the silo, a larger amount of stock fodder was raised each year. This rotation continued till 1900, increased the stock carrying capacity of the farm so that it produced coarse fodders enough, including pasturage, to carry an animal to the acre. In 1880, with eighty-five acres, including the pasture, only fifteen animals were kept. In twenty years, with the pasture out of the farm, it produced coarse food enough to keep thirty-five animals the entire year.

As was stated in the beginning, the farm is now being managed along practically the same lines. The cows are confined in the pasture less however, and the summer silo, built for that purpose, takes the place of quite an amount of soiling crops.

This is not phenomenal work. It is equalled and exceeded by many New England farmers today. But it shows what may be done on good New England soil, without large expenditures for feeds or fertilizers, and when so much of our area is lying practically idle, much of it in sections with many natural attractions and near food markets, it may possibly be an example that shall lead some others to go and do likewise.

EXCERPT FROM BULLETIN 123 OF THE VERMONT
EXPERIMENT STATION.

VI. THE MOISTURE RELATIONS OF SOIL.

The settled policy of the Station in regard to its fertilizer publications as outlined on page 141 of this issue, is yearly to make a feature of a discussion of some special topic. The statements bearing on this matter wherein provision is made for the dissemination of "information" in addition to the simple publication of analytical results, call for "information in relation to" the "character, composition, value and use" of fertilizers. During the past four years a fairly complete survey of matters in close "relation to" the purchase and use of fertilizers by Vermont farmers has been made. Analyses have been printed, comparisons with guaranties instituted, and the relationship of the selling price to the money value of the plant food contents of the various grades discussed; valuations, guaranties and their meaning, brand names and their lack of meaning, and the nature, sources and functions of the deficient elements of plant food have been considered; a classification of the brands of fertilizers sold in the State has been made; the character, composition, application and use of farm manures have been reviewed; the systems and methods which prevail in the use of plant food have been outlined, and suggestions offered as to amounts and kinds for the sundry Vermont soils and crops in the hope that it might serve as an aid in placing Vermont farm practice in this respect upon a higher plane and a more rational basis. While it is necessary yearly to make and to print analyses and to comment thereon, and advisable to discuss the financial phase of the proposition, the special features of bulletins 93, 99, 108 and 116 do not need repetition, at present at any rate, since these bulletins have been widely distributed and are still available on demand. The more obvious and immediate matter "in relation to" fertilization having been covered, it now seems fitting to review such as are less closely connected therewith, yet bear upon the adequate use of that popular commodity, the commercial fertilizer, to pass from the consideration of artificial means of soil betterment to that of natural ones.

It was said in the 1905 issue¹ that "it often happens that the commercial fertilizer is thought to be a panacea. It rarely succeeds on a poorly tilled soil. Failures may be due to a multitude of causes quite apart from the lack of plant food. Bad weather, drought, rains, poor seed, inferior preparation of the seed bed, inadequate cultivation, weeds, lack of drainage, soil acidity and the like may be at fault. Lack of plant food is not the only ill that crops are heir to. Such of these as are economically controllable by man should first be looked to before adequate returns are expected from added plant food. Weather conditions are beyond control, but an inexpensive irrigation system may be made practicable on many a Vermont farm. Simple germination tests (see page 43, bulletin III, for methods and illustrations) will protect against poor seed; thorough plowing, harrowing, cultivating, etc., will go a long ways towards insuring success; drain tile will take care of surplus water, and lime (see pages 96-103 bulletin 99, and pages 128-130 bulletin 114) of soil acidity. Let the user of purchased plant food look to those things which have to do with soil condition first, and to the 'phosphate sack' next, and the likelihood of a successful outcome will be enhanced."

Some of these subsidiary matters have been reviewed in the publications indicated; but one important one, the proper preparation of the seed bed, particularly in reference to its moisture relations, has not been thus far discussed in this series. Indeed, it seems likely that during the next few years reviews of sundry phases of soil management will be made the "features" of the larger annual fertilizer bulletins.

All soils are not like all coons. Far from being alike, they are highly dissimilar, and their unlikenesses are as yet but in part appreciated. These divergencies are of several sorts, as to origin, composition, physical characteristics and life content—and these differences are often reflected in varying crop yields.

Crop production is affected by several soil conditions, including:

1. Chemical composition.
2. Physical characteristics.
3. Biological content.
4. Weather conditions.
5. Moisture control.

It is not simply a matter of plant food, as was the early conception, and as indeed is today the popular notion. The moisture and heat relations, the fineness and arrangement of the particles,

¹Vt. Sta. Bul. 116, pp. 161-182 (1905).

the relation to its micro-organic life, are recognized today as important.

I. CHEMICAL COMPOSITION.

Soils vary greatly as to chemical composition, and naturally so. The product of disintegrated rock and decayed vegetable matter, they partake of the nature of the materials from which they are formed, mineralogically as well as chemically. Slate and limestone, for instance, are highly unlike, and soils derived therefrom are similarly unlike. Then, too, the natural processes of rock disintegration, the uneven weathering of rocks of varying types, the mechanical and chemical action of water, eroding here, dissolving there, have made gravel pits and sand banks, clay deposits and ox bows, have denuded the mountain slopes and enriched the valleys, have rearranged, sifted and sorted the various materials once distributed with some uniformity, but now in many cases concentrated. Moreover, throughout New England, soils have been profoundly affected and modified by glacial action, enriched here, impoverished there. Soils, then, are chemically unlike because of their varied origins and processes of formation. None of them contain the essential elements of plant food in the proportions in which plants use them. A large part of the soil performs no chemical function, but is simply a mechanical support and anchorage, a theatre for biological activities, a reservoir for water and for heat. It is the relative shortage of nitrogen, phosphoric acid, potash and lime in the soil, and their relatively large usage by plants which gives them their prominence. It does not follow, however, that soils containing equal amounts of these constituents, even though all conditions are similar, would possess equivalent crop producing powers. Their ultimate origin, whether from rocks which were dense and hard, or from those which were easily disintegrated, would be a factor in the case. The one soil would yield up its plant food reluctantly, the other readily; yet chemical analysis would indicate essentially equivalent crop producing powers.¹

2. PHYSICAL CHARACTERISTICS.

Soils contain not only nitrogen, phosphoric acid and potash in sundry combinations, but also air, water and heat. The proper aeration of the soil, its adequate moisture content, its warmth, are as essential to plant growth as is fertility, using the word in the narrow sense. They contribute to its development in that they are

¹See in this connection Vt. Sta. Bul. 116, p. 183 (1905).

the main agencies at work at the present time in the preparation of available plant food in the soil. This can only be serviceable in plant growth if it is in solution. The relationship of soil air in opening up the soil and rendering it permeable to water; the relationship of water to solution; and the relationship of warmth to ease of solution are all so well known as to need no remark. A dense and compact soil, being but slowly penetrated by water, yields its plant food but slowly thereunto and successful growth does not occur. Per contra, from a too open and porous soil the water rapidly removes such plant food as is soluble and the crop starves. The ills which follow in the train of over supplies or under supplies of water are well appreciated, as are also those which ensue from a late spring (too little warmth) or a prolonged drought (too much warmth with too little water).

3. BIOLOGICAL CONTENT.

The countless myriads of micro-organisms which live in the soil, though until recently unknown, and their functions but partially understood, are as important factors in soil fertility as are its chemical constituents or its physical characteristics. The modern concept of the soil is that it is a living entity rather than a dead mass; that it is a workshop rather than a storehouse, or, rather, a workshop in a storehouse wherein the tiny plants, too small to be seen save with the aid of the microscope, are actively at work transforming raw materials into available plant food, reducing the relatively complex dead animal and vegetable matter, manure, stubble, roots, humus, leaf mold, etc., into simple forms suited for plant nutrition.

These hosts of helpers are as truly plants as are the corn and clover which, because of their busy activities, are enabled to grow. They need air and water and warmth as do those of a larger growth. If either of these are lacking their growth is hindered or ceases. Since their function, viewed from the standpoint of soil management, is the development of available plant food from the soil, and since they are important though not the sole agencies to that end, it follows that such soil conditions as favor their growth enhance, and such as retard their multiplication lessens the crop producing power of the soil. These favoring and retarding conditions are not of a chemical nature, but physical in their character; from which it follows that bags of "phosphate" will not prove a cure all. Such a procedure simply substitutes added plant food for that which might be developed by natural means from stores already present in the soil. He who prepares a good seed bed, who lightens, aerates and pulverizes the soil, pro-

motes bacterial growth and thus develops actual from potential plant food.

4. WEATHER CONDITIONS.

The use of commercial fertilizers cannot alter the weather; but it may serve to even up matters, to act as it were as an insurance policy, augmenting the yields of unfavorable seasons and thus approximating those of more favorable ones, increasing yields and profits when the heavens are propitious and lessening losses when the skies lower. The climatic vagaries which are most apt to be harmful during the growing season are a lack of or an excess of rain. The lack may be supplied artificially from extraneous sources; the excess is removable by drainage; and each, but more particularly the former, is more or less amenable to control through the intelligent handling of tillage tools.

5. SOIL MOISTURE CONTROL.

IRRIGATION.

Irrigation supplies crops with water, plant food, or both. The practice has been in vogue from remote antiquity. Millions of acres in foreign countries and vast areas in the arid and semi-arid West are under irrigation. Many a desert soil is such because of lack of water. Well stocked with available plant food, it is valueless without and valuable with the access to water which irrigation affords. The sole difference between the oasis and the desert which surrounds it is that which the water creates.

Most Eastern readers are apt to conceive of irrigation as a project adapted to arid regions but of no service in regions where the rainfall is moderately abundant and fairly well distributed. It is freely conceded that it is not absolutely essential to profitable agriculture in such sections, but that it is often highly profitable under such conditions is recognized by the well-informed. Many practical men, particularly market gardeners and small fruit growers, feel that they cannot afford to take the chances of a possibly inadequate or ill-distributed rainfall, and therefore use an irrigation plant as an insurance policy—insuring a maximum crop. They install more or less expensive systems and spend considerable sums for water, to more than get it back again in the increased sales of their products, which are themselves mostly water. But costly devices are not needed. The many ponds, streams and springs which beautify Vermont's landscape, as well as its topography, lend themselves readily to the distribution and use of water. Many a hillside spring, impounded by a small dam,

might irrigate a meadow on a lower level, at slight cost and ample reward. Relatively light soils, and grass lands in particular, are benefitted by irrigation and, moreover, are less likely to be injured thereby when, as of course at times happens in humid climates, a heavy rainfall follows closely upon the heels of a liberal application of irrigation water.¹

DRAINAGE.

Too much water is as serious a fault as is too little water. Plant roots need air as much as they do water, and a water-logged soil, one in which the pore spaces are water filled instead of air and water filled, is ill fitted for the growth of an adequate quantity or a satisfactory quality of a crop. The roots are drowned as effectually, in the same way and by the same means, as is an animal. The larger part of Vermont soils are not in serious need of underdrainage. Their open subsoils or uneven topography provide for it. While large areas would doubtless be the better for it, it is equally beyond doubt that in most cases the cost of thorough underdrainage would exceed the value of the land. Brooks² states that it cost fifty dollars an acre to drain a medium compact Connecticut valley soil, laterals 35 to 40 feet apart and three and one-half feet deep, but remarks that this is an overhigh figure. English writers estimate the average cost at half this sum. Either is an almost prohibitive sum in view of the present price of Vermont farm lands.³

TILLAGE.

The commercial fertilizer does one thing—it furnishes available plant food to plant needs. It does that one thing very well—if it is a good fertilizer—but it is only one thing. Tillage does manifold things; things chemical, physical, biological; increasing soil fertility, modifying soil texture, augmenting soil life, conserving soil moisture, discouraging weed growth. That tillage in some degree does what the commercial fertilizer does, has long been recognized. That fineing the soil meant increased surface exposure of soil particles and their more ready solution; and that

¹Such readers as may care to pursue the matter further should send to the United States Department of Agriculture, Washington, D. C., for Farmers' Bulletin, No. 46, on "Irrigation in Humid Climates." Free for the asking.

²Agriculture, Vol. I, p. 175 (1901).

³Such readers as care to pursue this matter further should send to the United States Department of Agriculture at Washington, D. C., for its Farmers' Bulletin, No. 40, on "Drainage."

these meant greater plant food availability and increased croppage have been appreciated for years. But that tillage, because of its manysidedness, is a more potent factor in crop growth than is the fertilizer, is not as well appreciated by many farmers. Of its many functions, however, all important, none worthy of disregard, but one will be emphasized in this article, since space will not admit of a thorough and all embracing discussion of the subject. Hence, without in the least minimizing the importance of tillage as a carrier of available plant food to crop growth, as a profound ameliorator of the soil, as a promoter of the growth of desirable and a hindrance to the multiplication of undesirable forms of micro-organisms, as a means of aerating the soil or as a means for the destruction of weeds, for the reason that they are but briefly referred to, stress will be laid during the next few pages upon the relationship of tillage to the conservation of soil moisture, a function of the first rank.

CONSERVATION OF SOIL MOISTURE.

The productive capacities of a soil are measured not only by its chemical composition and its physical characteristics, but also by its moisture content. Its maintenance at as near an optimum as may be should be the goal of the husbandman, for this, more, perhaps, than any other one factor, is the measure of the crop's success. Moreover, the available supply is more nearly within his personal control than he is apt to think. So significant a matter, of such vital importance, warrants discussion in some detail.

Water is the main life constituent—in point of amount. From three-quarters to nine-tenths of plant, and from one-half to four-fifths of animal structure is water. Each needs ample supplies throughout life in order to attain to its full development. Plant life in particular needs water in large quantity and in a special form, while it cannot use it to advantage if in overabundant quantity or in the wrong form.

Soil water exists in three different physical conditions or "forms," all of them water, chemically alike, but physically unlike and economically different. These are (1) hydrostatic or standing water; (2) hygroscopic or invisible water; (3) capillary or rising water:

(1.) The standing water, the free running water of stream and pond, the water of the wells, which permeates and fills the soil at the lower levels and makes swamps and wet places, which rises and falls with rains and drought, the water of the water level or "water table":

(2.) The invisible water, enveloping the several soil particles, as it does almost everything on the earth, the pen with which

this word is written, the press which prints it, the paper which bears it, the hand which holds the page:

(3.) The rising water, passing upwards through the soil because of the pull of the capillary attraction of the minute pores or spaces between the soil particles, bathing the rootlets in a dilute solution of plant food, thus affording them both food and drink.

These several physical forms of water are chemically identical. They intergrade into each other, pass from one to the other and back again, under the influence of the sun which draws the water up and the rains which cause it to percolate downward again. The standing water is, speaking broadly, the source of the capillary water. If too near the surface it fills the soil pores, drives out the air and drowns out plant growth other than that of an aquatic character. Its main service in crop growth is as a reservoir for the available soil moisture, i. e., the capillary water.

The hygroscopic water is that moisture which adheres to the soil particles and clings there indefinitely, immovably, invisible, inappreciable, unavailable, useless to plant life but ever present. Its amount is relatively small in a soil in good moisture condition, and being of no avail for practical purposes may be dismissed without further consideration.

The capillary water, however, is the true soil moisture, that held within soil interstices from which plant roots feed. Its service is so important in plant growth that special consideration is given in this article to its nature and function.

Soil moisture in humid regions is a derivative of the rainfall. The effectiveness of this source of supply is conditioned on many factors, among which are the distribution of the rainfall, the nature of the soil on which it falls, the moisture needs of the crops and the method of handling the soil.

EFFECTIVENESS OF CAPILLARY WATER.

The *distribution of the rainfall* is obviously beyond human control. An overdry or overwet season often entails disaster. Yet the moisture which crops use is not necessarily or usually derived from the rains which fall during the growing season. Much of it finds its origin in the ground waters fed by the rains which fell during the non crop-growing season, which sink into the soil depths, there to be held as in a reservoir from which more or less steady and gradual drafts are made during the growing season through the action of capillarity. Hence it is that while the distribution of the rainfall is uncontrollable, the general meteorological characteristics of the locality being known, the procedure to be adopted in a given case may be adjusted thereunto. Thus, for instance, the system of soil cultivation in vogue in

the great California valleys where wet and dry seasons alternate, and where marvellously deep retentive soils are stocked with moisture against the needs of the dry growing season, would not obtain in the East and vice versa.

The *nature of the soil* on which the rain falls is well understood to be a determining factor. A soil of compact texture, the particles of which are finely subdivided, holds water tenaciously, while one of open texture, with relatively coarse particles, leaches readily. The one may be so impervious that water runs off of rather than into it, the other so porous that the drainage is almost complete. Many gradations between these extremes exist. While the dense clays and drifting sands and soils closely allied thereunto do not lend themselves readily to treatment, the more intermediate soils may be bettered as to their moisture relations. Soils of a clay type may be so handled as to render them more open and porous, to separate the too closely agglutinated soil particles, to gather considerable numbers of them into crumbs or granules. Liming does this, improving texture, cementing soil particles into masses, opening up and aerating the soil.¹ The use of barnyard manure, the plowing under of green manures are also advisable, though less effective.²

Oddly enough a similar treatment of sandy soil works advantageously, since liming tends to lessen the rapidity of percolation of water to lower levels, while the liberal use of manure introduces material of a highly absorptive and retentive character. In each case the ultimate result is the enhancement of the power of the soil to conserve soil moisture for plant uses.

The *usage of water* by plant growth is tremendous. The amount seems incredible to those not well informed. From 200 to 600 times the weight of the dry matter of the crop is pumped up by the roots into the circulation of the plant and passes off into the air from the leaves, the amounts varying with the nature of the crop and averaging not far from 300 times the dry weight. This means that a ton of hay, for instance, has used during growth somewhere in the vicinity of 300 tons of soil moisture, that a dry corn stalk weighing a pound has during its four months of growth pumped out of an apparently dry soil and vaporized from the surface of its leaves approximately 300 pounds of water. Large crops of hay, of corn or of potatoes draw several millions of pounds of water from an acre. The variation in the usage of water by the sundry crops is due largely to differences in the character and extent of their root and leaf areas, the inlet and outlet respectively of the moisture. Broad leaved plants naturally

¹See Vt. Sta. Bul. 99, pp. 102-103 (1903) on practice of liming.

²In this connection see statement under Drainage on pages 170-171.

are more prodigal in their expenditure of water than are narrow leaved crops. Shallow rooting plants are apt to use moisture more rapidly than do those whose roots penetrate the soil deeper, and it is obvious that they have a less ready access to it. Hence it is that they suffer sooner and more severely in drought than do deep rooting crops. Grasses and cereals are less avid users of soil moisture than are corn, clover, potatoes or most vegetables.

Another factor in this matter of moisture usage is the length of time during which the crop grows. A slow maturing crop can succeed on a soil moisture content which would fail to support one which grows more rapidly. Again, the use to which the crop is put bears relation to its water consumption. Garden vegetables, which owe much of their sales values to their succulence and to the rapidity with which they are forced, need optimum moisture conditions to promote their successful growth, while the slower maturing cereals may be stunted for a time and recover.

The *adequate handling of the soil* bears a close relationship to the effective usage of soil moisture. The distribution of the rainfall cannot be controlled, although it can be in some measure foretold and provided for; the character of the soil dealt with may not be all one would desire, though it may be bettered through intelligent handling; the usage of moisture by crops is inevitable and the amounts they use cannot be curtailed without lessening crop growth. The handling of the soil, however, be it adequate or inadequate, is within the power of the individual farmer to determine. It is within his grasp. He can profoundly modify it at will, can greatly benefit croppage by proper tillage, or let it suffer from its lack.

The operations of plowing, harrowing and cultivating all have a bearing on the control of the soil moisture. These common farm operations, when carelessly done, may fail to conserve needed moisture; but when carried out with a clear understanding of their relationship to water saving and of the proper procedure necessary to the attainment of that end, their service as moisture conveyors and purveyors to crop growth is beyond computation. Just what should be that proper procedure, however, is not always easily stated. Infallible rules universally applicable cannot be laid down. There are many varients which prevent the formulation of dicta, such, for instance, as the geographical and topographical location, the physical characteristics of the soil, its chemical composition, climatic conditions, the nature of the croppage. Hence it follows that while principles may be enunciated, their advantageous application must always be a matter of individual judgment.

NATURE OF CAPILLARY WATER.

Before the consideration of the specific tillage operations in their relation to moisture conservation is taken up, a clear idea should be had of the method whereby the soil moisture reaches the surface of the standing water levels as well as of the way in which tillage retards its escape from the surface of the soil.

It has been said that the soil moisture which is really available for crop growth is that which is known as capillary water. The soil is not a solid and impervious mass, but is full of pores; otherwise water could not sink into it. Different soils contain different proportions of pore space, varying all the way from a quarter to a half of their bulk. Even the hardest Macadam roadway contains some pore space. These openings between the irregularly shaped soil particles are very minute and are of an infinite variety of shapes. They act, so far as soil moisture is concerned, like capillary tubes. A capillary tube, as its name indicates, being derived from a Latin word meaning hair, is a tube of extremely small diameter. In tubes of this character liquids ascend against the force of gravitation to heights which vary as to their diameters, being drawn upwards the higher the smaller the diameter of the tube in which they are confined. Thus, in glass tubes of the diameters mentioned below, water rises above the level to the heights given:

Diameter 0.1 inch; water rises above level 0.5 inch.

Diameter 0.01 inch; water rises above level 5.4 inches.

Diameter 0.001 inch; water rises above level 54.0 inches.

This phenomena is caused by the attraction of the glass for the water. That such a force exists anyone can readily demonstrate for oneself with the simplest apparatus, a narrow glass tube and a tumbler of water. The oil in the lamp saturates the wick in this same manner, being pulled upwards through the interstices between the threads, incidentally saturating them in its passage. In the same manner the blotting paper absorbs ink. Now the soil moisture, drawn from the reservoir of the standing water of the lower levels towards and to the surface by this capillary action, passes off into the air—unless its passage is retarded or stopped. It is vaporized by the sun's rays and by the wind. The action is much like that of a lighted lamp. The oil in the lamp represents the water table, i. e., the level of the standing water in the well, the wick represents the soil and the flame the sun's rays. A few hours of illumination and the oil has been drawn up through the wick, burned and the products of combustion vaporized. A few hours of brilliant sunshine and vast quantities of water have been drawn up through the soil and vaporized from its surface. Immense amounts, thousands of tons annually per acre, are thus lost

for immediate and effective service. Water which is thus vaporized from the surface of the soil serves no purpose in agriculture save that of cooling it—sometimes an advantage but more often not—unless perchance there is an excess of water. The process is a natural one and its result inevitable. Neither process nor result can be abrogated; nor would it be desirable to stop their action if it could be done. It is the means whereby the plant roots gain sustenance for plant growth. It is the vaporization which is undesirable; and this, tillage may retard. It cannot prevent it; no means thus far devised can do this; but its extent can be lessened. Tillage retards the evaporation of soil moisture by the severance of the connection of the irregular and tortuous capillary tubes with the surface, by breaking and by clogging them. The widening of the upper portions of the tubes serves to lessen the height through which the water may be raised, while the clogging stops the water at a point just below the obstruction. Just as the San Francisco water supply was cut off by the breaking and clogging of the water mains in April's earthquake, so are the smaller water pipes of the soil broken when it is disturbed by tillage. And, furthermore, just as the water supply was reestablished when the broken conduits were repaired, so is the connection with the soil surface again restored naturally and soil moisture escapes again, unless recourse is had to frequent stirring of the soil. According, however, to the frequency of the surface cultivation during the earlier months of the crop growing season is the extent of moisture conservation. An infrequent cultivation retards moisture escape for the time being, but the readjustment of the surface soil particles naturally occurring results in a reestablishment of the connection of the surface tubes with those below, a repairing process as it were, and the former condition is renewed. In the absence of irrigation and if timely rains do not occur, the only chance for a maximum crop lies in keeping at it throughout the earlier part of the growing season.

Taking up now the specific tillage operations in the relationship to moisture conservation.

PLOWING.

The three furrow slices that are in common use are the flat, the overlapping and the rolling. The first of these completely inverts the sod, laying it flat in the bottom of the neighboring furrow. It completely severs the connection of the capillary tubes and is an effective method, viewed solely from the standpoint of soil moisture retention, though open to serious objection in other respects. The second system contemplates the production of a lapping furrow slice which carries a ridged and broken surface,

while that which is produced by the third system is greatly pulverized and broken. Neither the overlapping nor the rolling slice is apt to be quite as effective a moisture retainer as is the flat slice, but they are far more serviceable than the latter as means of absorbing snow and rain waters and thus augmenting the main source of supply.

Fall plowing in these latitudes is apt to be the better procedure on heavier soils. Such are opened up, rendered more porous, more pervious to water, which permeates the surface and penetrates the subsoil. They are favorably affected by the freezing and thawing, by the chemical and physical transformations which follow their exposure, particularly as regards the increased amount of plant food thus rendered available. In lower latitudes it is doubtless a more ideal condition to occupy such soil with a crop throughout the late fall, winter and early spring in order that fall and spring rains and thawing winter snows may be the better held and that there may be less soluble plant food lost. This consideration holds here, but not to the same degree. Water is apt to run off unabsorbed at such times from unoccupied soils, left in the stubble or fallow, particularly if of the more compact type; and these very soils are prone to suffer for the lack of that very abundance which was theirs in other seasons, but which they could not appropriate. It is well understood that a fall plowed piece should be left thus for spring handling and smoothing; if harrowed in the fall it is apt to puddle. For obvious reasons the fall plowing of lighter soils is less necessary.

Spring plowing on the heavier soils, if it must be practiced, should be done as soon as their condition will permit. Such a procedure will be in the interest of moisture conservation as well as of hastening spring work. Effort should be made to plow such soils at a time when they hold such an amount of moisture that they will crumble and break into a fine meal-like condition when the furrow is turned. To plow before the soil is dry enough is to invite clod formation and trouble.

Deep plowing—but not too deep, increasing in depth as the years pass on very slowly rather than rapidly—promotes moisture conservation, since it affords a larger area in which roots may ramble and hence more opportunity for them to absorb water. The fall season should be chosen as a rule for deep plowing, as the lower portions of the furrow slice may then be the better weathered and the better fitted for crop growing service. If the spring season is chosen, however, a shallower furrow slice is advised, lest the plant roots, of many crops at any rate, fail before the droughty days intervene to penetrate through the disturbed soil layers relatively lacking in moisture to the undisturbed moisture laden layers beneath.

HARROWING, ETC.

The sundry secondary operations, of discing, harrowing, rolling, etc., are means to the same end as plowing, having in view the fineing of the soil, the development of available plant food, the conservation of soil moisture, etc. The implements commonly used to this end are harrows and rollers. Each of the four types of harrows, the spike and spring tooth, the coulter and disc forms, has its place in soil preparation. No one of them is suited to all classes of work or to all sorts of soils. Their main function is more to prepare the seed bed mechanically than to alter its water relations. Yet they are of great service in that connection. Early spring surface tillage tends to warm, to dry, to aerate the soil, to lessen the loss of the deeper water by evaporation, and to hasten weed seed development so that when they sprout they may be the earlier, the more surely and the more easily be destroyed. It conserves soil moisture by means of the mulch it makes, which usually should be established by as prompt a passage of the harrow over the piece as is practicable after spring plowing, unless the soil is overwet.

The roller is not as commonly used in this State as it is in localities where the topography is less uneven. It is an implement which must be used with judgment lest it do more harm than good. Its main service is as a clod crusher, a surface soil compressor, an inciter of capillarity. In this connection its power to promote the conduction of water from the lower levels towards and to the surface, where it will be of service to the new seedlings which need ultra good conditions for germination, is to be noted as its chief reason for use. It should be remembered, however, that the water thus raised rapidly evaporates, more so from a smooth than from a rough surface, since the temperature is higher and the wind velocity greater over smooth than over rough surfaces. Hence he who uses a roller should as a rule run a bush, a weeder, a light running harrow, or something of the sort after or behind it in order to make a shallow mulch and save moisture. Its service is usually better on light sandy soils than on the heavier ones, which are already sufficiently compact; and it is obviously just such open soils which can least spare the water which the use of the roller brings to the surface.

INTERTILLAGE.

The sundry cultivators, weeders, hand tools and the like are used after the crop has started for weed killing, soil pulverization and moisture conservation. Several types of tools are used to this end. They may stir the soil deeply or may be run shallow,

but ordinarily should be so handled as to disturb but a slight depth of soil. There are several reasons for this:

1. The earth thus pulverized is for the time being out of service as a source of plant food.
2. The surface exposure of the relatively deeper and more moist soil hastens evaporation, which it is an object of intertillage to retard.
3. Deep cultivation tears off the root hairs of growing crops and thus gives the crop a setback.
4. Deep cultivation takes more time and power than does shallow culture.

At the outset the tools may be run to advantage deeper and more often than later, when the crop has got well under way and root systems are established. Late in the season, when the crops shade the ground, the mulch is protected from the sun and there is less rapid drying out and loss. Frequent intertillage is of advantage in that whenever resorted to it rebreaks the connection between the lower soil layer and the surface, forcing the capillary water to seek new channels of escape, retarding its passage and thus directing more to the roots. It also tends to increase the available plant food in the stirred portion, which, while not of use while in the dry mulch, will be of service later.

Level culture is apt to be preferable to ridged culture if moisture conservation is a factor. If the soil is likely to be overwet, the reverse will hold. The more the surface exposure the greater the evaporation. Local conditions, therefore, should suggest the type of cultivation to be used.

In conclusion, it should be remarked that it has not been intended in this article to discuss tillage in an all-round way, but more particularly its relation to moisture saving. Much more might be said as to other phases which has been left, for the time being at any rate, unsaid.

REPORT OF FORESTRY COMMISSIONER.

To His Excellency, Hon. Charles J. Bell, Governor:

In accordance with the law of this State, I herewith transmit my first annual report as Forestry Commissioner.

In the spring of 1905, regulations were prepared and issued for the planting of waste land to forest trees and the securing of tax exemption according to Act No. 74 of 1904. Some correspondence resulted and some interest was manifested, but up to date no one has taken advantage of the act.

Under Act No. 16, 1904, cloth posters were printed and distributed to all first selectmen and many private land owners in the State, and I believe were mostly properly posted. These were distributed in the spring of both 1905 and 1906.

Reports of first selectmen on forest fires were secured last winter from all towns of the state except Bakersfield and Somerset. Considerable unnecessary correspondence was required to secure these reports in many cases. In all thirty-four fires were reported with a total damage to property of only a little over \$5,000.00. No attempt was made to estimate the indirect damage done by these fires to the soil and their effect on future growth. This loss was only about 3 percent of the loss in 1903, the only other year for which I have any knowledge of an attempt to estimate Vermont's loss from forest fires. The comparatively small loss was largely due undoubtedly to the favorable season, but also to some extent, I believe, to the effect of the law. The chief points are shown by the table:

Town.	Value property destroyed.	Cause.	Expense fighting.	Acres burned over.
Burke	\$ 65 00	Locomotive,	.....	8
Cavendish	200 00	Locomotive,	\$ 6.60	20
"	500 00	Locomotive,	.....	60
Chester	10 00	Children,	.....	4
"	25 00	Hunters,	.....	100
Danville .....	.....	"	.....	...
Dorset	300 00	Smokers,	.....	100
Dummerston	2000 00	Locomotive,	.....	200

Ferrisburgh	.....	Burning brush,	2.00	6
Georgia	.....	Locomotive,	.....	25
Goshen	300 00	Burning brush,	.....	12
Greensboro	.....	Unknown,	17.75	12
Jamaica	.....	Locomotive,	.....	100
Lyndon	.....	"	11.00	15
Milton	.....	Unknown,	3.00	35
"	.....	"	2.00	20
Pawlet	.....	"	4.50	50
"	.....	"	.....	30
Pownal	10 00	"	2.00	20
"	20 00	Locomotive,	.....	10
Reading	10 00	Automobile,	4.00	1
Rockingham	15 00	Unknown,	.....	3
"	.....	Boys,	23.75	20
"	.....	Locomotive,	.....	6
"	.....	Unknown,	.....	10
Royalton	.....	"	.....	1/4
Shaftsbury	90 00	"	2.50	15
Springfield	.....	"	8.00	4
Thetford	.....	Sap boiling,	.....	2
"	.....	Burning brush,	.....	5
Topsham	.....	Unknown,	.....	3/4
Vernon	1580 00	Locomotive,	49.95	200
Westminster	25 00	Unknown,	.....	10
Woodbury	.....	Burning brush,	.....	1/2

During the period covered by this report two bulletins have been issued, one containing the laws of the State relating to forestry, regulations for tree planting and suggestions as to forest fires. The other bulletin contained a lecture by Dr. B. E. Fernow, delivered in Burlington, Jan 24, 1906, before the Forestry Association of Vermont. The commissioner has not felt it necessary to do much in the way of issuing bulletins, because there is already so much in print from the U. S. Forest Service and the various experiment stations readily available. Among the most valuable of these publications may be mentioned:

The Trees of Vermont, Bulletin 73, Vermont Experiment Station, Burlington.

Planting White Pine in Vermont, Bulletin 120, Vermont Experiment Station, Burlington.

Forestry (Native Pine Seedlings), Bulletin 119, New Hampshire Experiment Station, Durham, N. H.

How to Grow a Forest from Seed, Bulletin 95, New Hampshire Experiment Station, Durham, N. H.

How to Make a Beginning, Bulletin 106, New Hampshire Experiment Station, Durham, N. H.

The following are some of the most practical of the publications of the U. S. Department of Agriculture, Forest Service: Planting of White Pine in New England, Bulletin 45.

Natural Replacement of White Pine on Old Fields in New England, Bulletin 63.

The Forest Nursery, Bulletin 29.

The Wood Lot, Bulletin 42.

The Forest Service, what it is and how it deals with Forest Problems, Circular 36.

Circular 36 contains a list of the publications of the U. S. Department on Forestry. To secure it, or any of the above, address The Forester, U. S. Department Agriculture, Washington, D. C. It may also be noted that the Year Books of the Department of Agriculture and the Reports of the Secretary of Agriculture back for nearly twenty years each contain more or less valuable matter on forestry.

The importance of the forestry problem to Vermont can hardly be overstated. Out of a total land surface of 5,846,000 acres, nearly four millions are of little value except to produce wood and timber. Properly handled, these waste lands should produce for the people of the State a net income of from one to two dollars per acre per year. Under present conditions much of it is producing nothing.

As being steps in the right direction, I suggest action by the Legislature on the following subjects:

1st. We should secure accurate information as to our present forestry conditions. We have now no definite knowledge of our forest resources. This information could be secured either through cooperation with the Federal Forest Service (as was done in New Hampshire) or independently.

2nd. It will be observed that about half the fires of last year, of which the causes are known, and nearly all the damage, were caused by the railroads. Legislation to lessen this danger seems to be called for.

3rd. One great obstacle to the planting of waste lands at present is the excessive cost of the little trees. If the State would cooperate with the Agricultural College in the establishment of a forest nursery (a beginning has already been made by the College), material for planting could be furnished our people at less than half present cost and the expense to the State would be very small.

4th. Ultimately there can be little doubt but that Vermont will take up the work, already being done in other states, of acquiring and planting to forest the worst of our waste lands. The

financial profit of such an enterprise is as well assured as can be the future profit of any business enterprise. And the benefit to the State in other ways is equally certain. I believe that it is high time we began to investigate the possibilities of this enterprise and to consider the proper way in which it should be entered upon.

And lastly, and perhaps the matter of most pressing importance, the present Legislature should not adjourn without making adequate provision to fight any invasion of the gypsy or brown tail moths, from which the State is liable to suffer in any year. The danger is an imminent one. It is not just, nor is it safe, to leave this matter to the individual towns in which outbreaks may first occur.

The expenses of the Forestry Commissioner from Jan. 1st, 1905, to July 1st, 1906, have been as follows:

Commissioner's per diem.....	\$124 00
Commissioner's travelling and hotel expenses.....	60 64
Postage	76 08
Printing two bulletins	47 00
Cloth posters (two years)	186 07
Miscellaneous printing and stationery	24 58
Expressage, telephones, etc.	6 05

\$524 42

Respectfully submitted,

ERNEST HITCHCOCK,

State Forestry Commissioner.

Pittsford, Vt., July 1st, 1906.

ADDRESS DELIVERED AT THE LAYING OF THE CORNER-STONE OF MORRILL HALL, JUNE 26, 1906.

BY ERNEST HITCHCOCK, PITTSFORD, VT.

There is no period in a man's career more interesting to others or important to himself than when he makes his choice of the business or profession to which he is to devote his life. It is pertinent, on an occasion like this, to inquire what the occupation of farming has to offer an intelligent educated man about to make this choice.

In the first place we must admit, and we admit it without reluctance, that to the man who regards the mere accumulation of great wealth as the sole or even the chief criterion of success the occupation of farming will present few attractions. There are certain limitations, imposed either by natural or economic laws, that seem to prevent, at least under our normal eastern conditions, such accumulation of wealth by the farmer. This general condition is commonly recognized, but some of the reasons may be worth specifying. In the first place, and probably most important, the eastern farmer is by natural conditions precluded from doing an extensive business as we reckon extensive in the modern business world. As compared with the aggregate business done by men engaged in mercantile, manufacturing and extractive enterprises the business of the farmer is and will indefinitely remain small. As a rule, barring some lucky discovery, invention or speculation, the great fortunes of our time which have been legitimately acquired, have been built up, not by a high percentage of profit, but by a comparatively small percentage of profit on a large business. Many farmers make a percentage of profit which to a merchant or manufacturer would seem enormous, but for reasons we can not take time to specify the farmer is unable to extend his operations beyond certain moderate limits. In fact, the best opinion seems to be that our progress is to be in the direction of intensive rather than extensive improvement. The young farmer can hardly hope to improve on the conditions of his father by extending his operation over an entire town or county, but rather by rendering more productive the ancestral acres. Indirectly this limitation operates very seriously against the farmer

in another way. Every good business man knows best his own business. The man who can invest his savings in extending the business of which he is already the master has the best chance of further success. The farmer who already owns a large, well improved and well stocked farm has no such opportunity. As a result his savings are invested in unknown fields; and experience has shown that results are often unfortunate.

The farmer can establish no monopoly. The production of agricultural staples is too widespread, the amount produced by each individual bears too small a proportion to the entire output, to render any attempt to increase prices through a combination to reduce production, possible. Nor can he enjoy that monopoly in the possession of brains, experience or reputation which enables one doctor or lawyer to charge a thousand dollars for a service which another would be glad to perform, perhaps equally well, for twenty-five. One bushel of wheat or pound of pork is very much like another, and while pounds of butter do differ very materially amongst themselves, yet in our day the enormous quantity of practically perfect butter renders any such difference of price impossible.

The prices of farm products are materially reduced, and of course profits as well, by the persistency of competition on the part of those producing goods at a loss. When a parcel of goods appears in the market it thereby increases the visible supply and tends to reduce the price. The question of profit to the producer cuts no figure at this stage. While no statistics are available it admits of no doubt that a large proportion of the demand for agricultural products is supplied by goods which have been produced at an actual loss. Now this is not true to so large an extent in any other line of business. Agricultural products compete in the same market whose cost of production varies 50 percent and more. In manufacturing and commercial pursuits a difference of one or two percent is ordinarily decisive. If a merchant or manufacturer fails for any length of time to realize a profit he goes out of business, either voluntarily or with the help of his creditors. He ceases to be a competitor as soon as it is settled that he is a failure. His goods soon cease to help to glut the market. Not so with the farmer. Year after year he clings to the old farm. Year by year the interest is added to the mortgage. Year by year the soil grows poorer, the stock scrubbiier, the farmer's living harder. And still the output of that farm enters the market to help force down the price of agricultural products. The leniency of a creditor often allows such a state of things to go on for years, even after the security of his loan has become impaired. It is not that competition is less severe in agriculture but that it is less sudden, less decisive in

its effects on unsuccessful competitors, thus permitting their continuance in business to glut the market in which the more skillful must dispose of their product.

There are other causes which have contributed to limit the wealth producing power of the farmer. In the years that have gone the eastern farmer has suffered a competition unparalleled in history due to the opening of the West, part of this necessary and legitimate, much of it grossly unjust owing to the reckless manner in which our public domain has been squandered. Again, I believe it admits of no dispute that an unjust share of the burden of taxation has been imposed on the farmer by the state and still more by the national government. But enough of this. Let us look with equal brevity at the other side of the picture.

While the farmer cannot hope to become a billionaire or even a modest millionaire, his occupation does offer a reasonable pecuniary compensation. There are farmers, too many of them, who fail, but failures are not confined to agriculture. Go into any city, follow through any line of business and see the proportion of failures to successes. To learn that many farmers succeed you have only to go through the valleys and amongst the hills of our own State. Abandoned farms you will find, but they need cause no one anxiety. The final word on this subject was spoken when some one remarked: "Good farmers do not abandon good farms."

Again, to-day farming is practically the only occupation in which the man of moderate means can do an independent business. It may be true that the young man of to-day with his own way to make has as good an opportunity for success as his father; but it certainly is not in the way of building up an independent business, but rather and only by making himself useful to some existing corporation. The day of modest things has passed. The man with a few thousands invests it in an independent business at the imminent risk of having his fortune and his business wiped out by the competition of capitalized millions. And the position of the salaried servant of a great corporation is not in all respects an enviable one. However high his salary, unless he controls the stock, he is still but a servant. He holds his position subject to the one test of results. If he can't pay dividends he must give way to the man who can. Results, not methods, count. The strenuous life may be all right, but too often it is followed at the pace that kills, dwarfs and kills mentally, morally and physically. And so I say that the farmer has not only the single occupation in which the man of modest means may be independent, but also the one in which he runs no risk of meeting a situation where he may be compelled to choose between the sacrifice of all he has spent his life to gain and the doing of some act inconsistent with the

maintenance of the highest self-respect. It is true we have in the last few months seen something of a moral awakening. It is worth remembering, however, that human nature has not changed. Much of the indignation has been merely perfunctory, much of it has had no deeper source than the natural wrath of the human animal at having been robbed. The waters have been stirred. We have yet to see the actual accomplishment of a moral revolution.

And lastly, and perhaps best of all, I want to say that to the intelligent educated man the farm offers a field for intellectual activity unequalled by any other commercial pursuit. None other so broad, none other so close in its possibilities to the heart of the great mother of us all. Time forbids details, but the story of the new agriculture would to our fathers read like a fairy tale. After all the farmer must be born before he can be made. To the man with the inborn love of the soil, of animals and of plants, the life is not one of drudgery; nowhere outside this realm can man approximate more closely to the exercise of the divine power of creation. If he cannot actually create, he can guide and direct the operations of nature to his own ends and thereby experience a satisfaction a mere millionaire can never know.

• We are here to-day to lay the corner-stone of Morrill Hall, which will soon become and long remain the home of the Agricultural College of the State of Vermont. Under any circumstances such an occasion would be interesting and impressive. Especially so is this event, because it is rendered possible by the act of the State, its first important grant to this institution, almost the first recognition by the State of its obligation to this University, already past its one hundredth anniversary. No more important question can be considered by our people than the proper relation between the State and its highest institution of learning. We should recognize that here and nowhere else is our State University. There should be not only an attitude of cordial interest and careful supervision on the part of the State, but also a recognition of the obligations to give pecuniary aid bearing proper proportion to the needs of the institution and the ability of the State. Is it too much to hope that in the golden future to which we are all looking, the interests of the youth of our State who do not belong to either the pauper or criminal classes, may receive some share of the attention which has been recently lavished so extensively, perhaps necessarily, on our jails, our prisons and our asylums?

It should be borne in mind that the grant which has made Morrill Hall possible is not in any sense class legislation. Its purpose and effect are not to benefit the farmer, but the entire population through the improvement of agricultural methods.

These improved methods mean simply cheaper production and cheaper production means reduced cost of foods. Inevitably, in the absence of monopoly, cheapened production aids the consumer rather than the producer. It is only as the producer, by alertness, introduces the improved method in advance of his competitors that he reaps an advantage. In the end the result of the work of our agricultural colleges and experiment stations is not to increase farmers' profits, but to cheapen the food of the masses. The relationship of which we have been speaking is not one-sided. The College as well as the State has its obligations. I have, however, little sympathy with the cry which has so often gone up that our colleges give us something "practical." Too often this call has come from men who have no appreciation of what really constitutes true education. The college should turn out educated men, and an educated man is a man of trained mind. Possession of a large stock of knowledge is not vital, but the ability to reason clearly, from cause to effect and from effect back to cause. The character of the course of study is of less importance than the type of mind developed. The one American farmer who has probably had more influence than any other man on the character of soil cultivation was educated in an old-fashioned classical college. Technical training is proper, and we shall have more of it rather than less, but it should be possessed by educated men. To turn out men with trained minds is the business of our colleges.

We hear much nowadays of the "New Vermont." I never liked the phrase, but the thought is of more consequence than words. The question whether the Vermont of the future shall be worthy of the Vermont of the past is the vital one. In determining that question I believe no consideration is of more importance than the character of the work done here on this hill. A well endowed, well equipped institution, in proper relation with the State, with the people of the State and with the educational system of the State, would mean much for our future. Let us hope that the act done here to-day may be an important step towards the realization of our ideals.



Barber Photo
Burlington, Vt.

A CORNER OF MACHINERY HALL.

REPORT
OF THE
THIRTY-SIXTH ANNUAL MEETING
OF THE
Vermont
Dairymen's Association
1906

Compiled by F. L. Davis, Secretary



BURLINGTON:
FREE PRESS PRINTING CO.,
PRINTERS, BINDERS, STATIONERS,
1906.

An Act to Promote the Dairy Interests of Vermont.

It is hereby enacted by the General Assembly of the State of Vermont:

Section 1. The sum of one thousand dollars is hereby appropriated annually to the Vermont Dairymen's Association, for the purpose of promoting, developing and encouraging the dairy interests of this State.

Sec. 2. The Auditor of accounts is hereby directed to draw an order on the State Treasurer in favor of the Treasurer of the Vermont Dairymen's Association, for the first payment of this appropriation on the first day of January, A. D., 1889, and annually thereafter so long as the conditions hereinafter provided shall be complied with.

Sec. 3. Said Vermont Dairymen's Association shall hold an annual meeting, continuing for at least three days, at some town or city in this State of easy access to the people, and in some comfortable and convenient building; and said meeting shall be open and free to the people of the State. At said meeting the best available talent in the country shall be employed to teach and discuss the best methods of dairy farming, and subjects connected therewith; and at the said annual meeting, premiums shall be offered for the best dairy products of butter and cheese, to an amount of at least two hundred dollars; such premiums to be awarded by disinterested and expert judges, and paid by the Treasurer of said Vermont Dairymen's Association.

Sec. 4. The Secretary of the Vermont Dairymen's Association, shall, on or before December 1, 1889, and annually thereafter, make a detailed and itemized account to the State Auditor of Accounts of the receipts and expenses of said Association, which accounts shall be approved and countersigned by the Treasurer and Auditor of said Association.

Sec. 5. If, in any year, it shall appear to the State Auditor of Accounts that any part of the preceding annual appropriation remains unexpended, or has not been honestly or judiciously expended, then such a part or amount shall be deducted from the order for the next succeeding annual appropriation.

Sec. 6. This act shall take effect from its passage.

Approved November 19, 1888.

An Act to Provide for the Printing of the Report of the Vermont Dairymen's Association.

It is hereby enacted by the General Assembly of the State of Vermont:

Section 1. Section two hundred and forty-seven of the Vermont Statutes shall be amended to read as follows:

The Secretary (of Board of Agriculture) shall prepare on or before the 30th day of June annually, a detailed report of the proceedings of the Board with such suggestions in regard to its duties and the advancement of the interests herein specified as may seem pertinent, and he may append thereto such abstracts of the proceedings of the several agricultural societies and farmers' clubs in the State as may be advisable and the report of the Vermont Dairymen's Association. The report shall show under separate heads the work of the Board relating to the different subjects herein mentioned.

Sec. 2. The provision of section two hundred and fifty-one of Vermont Statutes requiring the printing of a report by the Vermont Dairymen's Association is hereby repealed.

Approved November 4, 1896.

Constitution.

Section 1. This organization shall be called the "Vermont Dairymen's Association."

Sec. 2. Its object shall be to improve the dairy interests of Vermont, and all subsidiary interests.

Sec. 3. This Association shall consist of such persons as shall signify their desire to become members, and pay the sum of one dollar, and a like sum annually thereafter, and of honorary and corresponding members.

Sec. 4. The payment of five dollars shall constitute a life membership, or the payment of an annual membership fee of one dollar for five consecutive years shall constitute a life member.

Sec. 5. The officers of the Association shall be a President, two Vice-Presidents (one from each Congressional District), a Secretary, Treasurer and Auditor, who shall constitute the Executive Committee, and have the general oversight of all the affairs of the Association.

Sec. 6. There shall be held, during each winter, an Annual Meeting, at such time and place as the Executive Committee may designate, for addresses, discussions, exhibitions, and the election of officers, who shall hold their respective offices for one year, or until their successors are chosen. Said meeting shall continue in session at least three days.

Sec. 7. It shall be the duty of the Secretary to prepare an Annual Report of the transactions of the Association for the current year, embracing such papers, original or selected, as may be approved by the Executive Committee, and cause the same to be published and distributed to the Dairymen of the State of Vermont.

Sec. 8. The Treasurer shall keep the funds of the Association and disburse them on the order of the President or Vice-President, countersigned by the Secretary, and shall make a report of the receipts and expenditures to the Annual Meeting.

Sec. 9. This constitution may be amended at any Annual Meeting by two-thirds vote of all the members present.

OFFICERS OF THE VERMONT DAIRYMEN'S ASSOCIATION.

1906.

PRESIDENT.

D. H. MORSE, ... Randolph

VICE-PRESIDENTS.

B. A. HATT, ... South Ryegate

GEORGE DINSMORE, ... Swanton

SECRETARY.

F. L. DAVIS, ... North Pomfret

TREASURER.

M. A. ADAMS, ... Derby

AUDITOR.

C. F. SMITH, ... Morrisville

Miss Margaret Chestnut, Stenographer, Burlington.

Rules for Dairymen Suggested by the Vermont Dairymen's Association.

The Stable.

1. Stables should be well ventilated, lighted and drained; should have tight floors, walls, and be plainly constructed.
 2. No musty or dirty litter, no strong smelling material, and no manure should remain in the stable longer than is absolutely necessary.
 3. Whitewash the stable once or twice a year. Would recommend using land plaster in manure gutters daily.
 4. Feed no dry, dusty fodders previous to milking. If dusty, sprinkle before it is fed.
 5. Keep stable and dairy room in cleanly condition.
-

The Cows.

1. Keep only healthy cows. Promptly remove suspected animals. In particular, add no cows to the herd unless it be certain that they are free from tuberculosis.
 2. Do not excite cows or expose them to stress of weather.
 3. Feed a good cow liberally with fresh, palatable feeding stuffs. Do not change these suddenly. Provide water, pure but not too cold, in abundance.
-

Milking.

1. The milker should be clean, and his clothes likewise.
2. Brush the udder just before milking and wipe with a clean cloth or sponge.
3. Milk quietly, quickly and thoroughly.
4. Throw away into the gutter the few first streams from each teat. This milk is very watery, of very little value, and is quite apt to injure the remainder of the milk.

5. Remove the milk promptly from the stable to a clean, dry room where the air is pure and sweet.

6. Drain the milk through a clean flannel cloth, or through two or three thicknesses of cheesecloth.

7. Aerate and cool the milk as soon as it is strained. The cooler it is the more souring is retarded. If covers are left off the cans cover with cloths or mosquito netting.

8. Never mix fresh, warm milk with that which has been cooled, nor close a can containing warm milk, nor allow it to freeze.

9. Under no circumstances should anything be added to milk to prevent it souring. Such doings violate the laws of both God and man. The chemicals which are used for this purpose are slow poisons. Cleanliness and cold are the only preservatives needed.

10. In hot weather jacket the cans with a clean, wet blanket or canvas when moved in a wagon.

Utensils.

1. Insist that the skim milk or whey tank at the factory be kept clean, in order that the milk cans may not become contaminated.

2. Wash all dairy utensils daily, thoroughly rinsing in boiling hot water and a little washing soda, scald and drain. Boil strainer cloths daily. After cleaning, keep utensils inverted in pure air, and sun if possible, until wanted for use.

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LIFE MEMBERS OF THE VERMONT DAIRYMEN'S ASSOCIATION—1906.

Adams, M. A.	Derby
Allen, Charles	East Berkshire
Armstrong, A. B.	Dorset
Allen, H. A.	West Milton
Allen, Henry	Pawlet
Adams, William H.	Keene, N. H.
Aseltine, M. L.	North Fairfax
Aldrich, E. O.	Shrewsbury
Adams, G. W.	Stowe
Akley, E. H.	Dummer
Aitken, George	Woodstock
Allen, G. A.	W. Brattleboro
Burnett, R. E.	Bethel
Burbank, J. A.	N. Pomfret
Burr, L. R.	N. Clarendon
Benedict, G. G.	Burlington
Blake, Geo. Boardman	156 Congress St., Boston, Mass.
Bronson, T. G.	East Hardwick
Bell, C. J.	East Hardwick
Barstow, J. L.	Burlington
Brownell, C. W.	Burlington
Briggs, Nelson	Brandon
Brigham, William O.	Bakersfield
Buck, Abner	Buck Hollow
Buck, A. N.	N. Ave., Burlington
Burt, William	Essex
Burt, Frank	Enosburg Falls
Ballard, B. M.	Fairfax
Blair, N. B.	Morrisville
Bliss, Abner	Georgia
Bliss, O. S.	Georgia
Beecher, H. A.	Ilinessburg
Bates, A. E.	Huntington
Barnum, Ell	Plainfield, R. F. D. 1
Bent, C. C.	Marshfield
Brown, J. S.	Plymouth
Bishop, D. B.	North Williston

Bond, John	E. Montpelier
Blood, W. O.	Swanton
Bass, E. L.	Randolph
Blake, William, H.	Swanton
Bruce, H. C.	Sharon
Bell, F. C.	Swanton
Barry, Leonidas	Springfield
Brothers, H. F.	Hinesburg
Brackett, W. R.	9 Chatham St., Boston
Bean, G. C.	Coventry
Belden, H. W.	Waitsfield
Bickford, F. H.	Bradford
Buxton, J. E.	Middletown Springs
Brock, L. F.	Barnet
Brainerd, E. P.	St. Albans
Bristol, R. T.	Vergennes
Bushnell, J. H.	Williston
Barber, E. L.	North Williston
Bushnell, H. N.	Waitsfield
Butler, F. G.	Hartford, Conn.
Burrell, D. H.	Little Falls, N. Y.
Baker, J. W.	Syracuse, N. Y.
Brewer, J. R.	Hingham, Mass.
Burghan, W. H.	Montpelier
Beach, W. V.	Charlotte
Bent, Orrin	57 Quincy Market, Boston, Mass.
Brown, B. B.	Williston
Clifford, A. P.	N. Pomfret
Cushman, G. L.	75 S. Market St., Boston, Mass.
Carpenter, E. P.	West Waterford
Chaffee, J. H.	East Enosburg
Cilley, S. T.	Fairfax
Congdon, Edwin	Clarendon
Cannon, LeGrand B.	Burlington
Cahee, J. L.	Brandon
Cahee, L. J.	Brandon
Currier, P. W.	Montpelier
Clarke, M. S.	Clarendon
Coburn, J. A.	East Montpelier
Coburn, J. L.	East Montpelier
Campbell, H. W.	Holdridge, Neb.
Cutts, H. T.	Orwell
Colburn, H. F.	Rutland
Chapman, J. H.	West Rutland
Cowden, H.	St. Johnsbury

Colburn, R. M.	Springfield
Crampton, Charles A.	St. Albans
Curtis, J. K.	Georgia
Chapman, George A.	Williston
Cooley, William, ...	Waterbury
Cobb, C. H.	Westford
Crane, George	Brookfield
Chase, C. P.	Proctorsville
Chandler, G. C.	Montpelier
Claffin, G. H.	St. Albans
Chase, Perry	E. Fairfield
Carpenter, O. G.	Cambridge
Clark, M. W.	North Williston
Colburn, H. W.	North Pomfret
Candon, J. B.	Pittsford
Choate, C. A.	W. Barnet
Cloverdale Creamery	N. Underhill

Donahue, W. C.	Monkton
Draper, F. W.	Enosburg Falls
Dana, E. Y.	N. Pomfret
Donahue, J. F.	Vergennes
Doe, G. A.	Newbury
Douglass, O.	25 John St., Boston, Mass.
Dutton, F. B.	Woodstock
Davis, G. A.	Rutland
Donahue, W. F.	Ferrisburg
Donahue, T. E.	Hinesburg
Dodge, Harrison	Morrisville
Davis, George	East Montpelier
Donahue, D. G.	East Charlotte
Dwinell, L. G.	East Calais
Dwinell, Albert	East Calais
Davis, George F.	Cavendish
Dewey, Ed.	Montpelier
Dewey, Charles	Montpelier
Davis, C. H. E.	Healdville
Douglass, B. J.	Pittsford
Davis, F. L.	North Pomfret
Denio, W. B.	East Rupert
Douglass, W. B.	Williston
Dagon, M. R.	Madison, Wis.
Deal, T. M.	St. Albans

Eldred, H. S.	Sheldon
Evarts, A. D.	Bristol

Ellis, I. L.	Middlebury
Eaton, I. H.	Plainfield
Eddy, H.	Waterbury Center
Edson, E. A.	Chester
Eddy, C. F.	Stowe
Flint, J. P.	Montpelier
Fisher, L. C.	Cabot
Farrington, C. W.	West Danville
Fletcher, William	Essex Junction
Fassett, G. S.	Enosburg
Fisher, D. W.	Rutland
Ferson, B. W.	Brandon
Fassett, B. F.	Enosburg Falls
Fassett, W. G.	Enosburg
Fuller, C. C.	Jonesville
Fassett, A. B.	East Berkshire
Field, D. L.	West Milton
Forbes, D. A.	Orwell
Frink, W. B.	Swanton
Freeman, H. O.	Sherburne, N. Y.
Gale, P. R.	Stowe
Grout, L. D.	Morrisville
Giddings, W. A.	Bakersfield
Grout, Hon. J.	Derby
Gibson, J. P.	Mt. Holly
Gloyd, Jesse	Richmond
Gilman, A. A.	Randolph Center
Gleason, H. C.	Shrewsbury
Goodspeed, Nelson	St. Albans
Graves, C. O.	Waterbury
Gallup, J. A.	W. Woodstock
Greene, G. F.	S. Pomfret
Gates & Son, Chas.	N. Hartland
Gilson, Truman	Suncook, N. H.
Gale, J. E.	Guilford
Howie, Mrs. A. F.	Elm Grove, Wis.
Hatt, B. A.	South Ryegate
Hastings, S. J.	Passumpsic
Harvey, Cloud	Barnet
Hibbard, C. A.	Burlington
Hills, J. L., Prof.	Burlington
Humphrey, A. O.	Burlington
Hayward, G. M.	E. Corinth

Heller & Merz Co.	22 Cliff St., New York
Holden, Eli	Barre
Holliston, E. B.	Manchester Center
Hotchkiss, C. A.	Georgia
Hefflon, Franklin	Highgate Center
Haskins, Kittredge	Brattleboro
Hutchinson, William	Norwich
Hill, H. C.	Isle LaMotte
Hillis, E. C.	N. Montpelier
Howard, Ernest S.	West Hartford
Hall, L. C.	Westford
Herrick, A. A.	West Milton
Hall, Charles	Montpelier
Head, George G.	Montgomery
Harwood, J. W.	Orwell
Hines, Ed.	Pittsford
Hewitt, Stephen	North Pomfret
Howe, W. H.	S. Royalton, R. F. D.
Hayes, J. R.	Strafford
Hitchcock, Ernest	Pittsford
Higley, Nathan	Richmond
Hodges, R. W.	Randolph Center
Hopkins, Daniel	Waterbury Center
Huse, S. R.	Waterbury Center
Hazen, C. D. Jr.	Wilder
Harwood, Burr	Dorset
Harris, S. L.	Proctor
Huntley, George M.	Westford
Healey, W. M.	Dudley, Mass.
Hopkins, Hermann, Jr.	Sheldon Junction
Hannum, P. C.	Weston
Harrington, W. H.	N. Pomfret
Hastings, C. A.	Springfield
Hayward, F. R.	Topsham

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Jackson, J. J.	Montpelier
Johnson, Arthur	East Ryegate
Johnson, A. B.	Malone, N. Y.
Jaynes, R. F.	Waterville, Me.
Jewett & Son	Middlebury
Jones, G. M.	Waitsfield

Kelley, G. A.	Marshfield
Kingsley, H. E.	Montgomery
Kinerson, J. R.	Peacham
Kidder, N. D.	Hastings, Neb.
King, M. D.	Woodstock
Kneeland, D. A.	Waitsfield
Kenfield, Frank	Morrisville

Leonard, H. B.	North Pomfret
Leonard, N. O.	Fairfax
Lord, W. H.	Mechanicsville
Lane, B.	Newport
Loveland, Aaron	Norwich
Lyster, T. H.	St. Johnsbury
Lawrence, Henry	St. George
Lawless, C. C.	Montpelier
Le Page, Chas.	Barre
Loveland, J. H.	Norwich
Leary, J. A.	Jericho
Leonard, W. B.	Barton Landing
Lewis, M. J.	Woodstock
Lewis, A. L.	Rochester

Monrad, J. H.	173 Chambers St., New York
Maynard, H. S.	Bakersfield
Mann, J. M.	Fairhaven
Marvin, Thomas	Montpelier
Moseley, F. W.	Clinton, Iowa
Miller, M. H.	Pomfret
Messer, F. A.	Greensboro
Montgomery, Roy	Warren
Moore, A. A.	Richford
Morse, D. H.	Randolph
Maxham, G. R.	Woodstock
Macomber, D. H.	Essex Junction
McMahon, C. L.	Stowe
Macomber, W. H.	Westford
McLam, J. F.	W. Topsham
Macomber, F. H.	Shelburne
McNall, J. M.	Milton
McGaffey, E. E.	Lisbon, N. H.

Nelson, David	34 Allen Ave., Springfield, Mass.
Newton, C. H.	Fargo, North Dakota
Nash, D. W.	Beldens
Nay, Y. G.	Jericho

Northrop, P. B. B.	Sheldon
Newell, Bigelow	Stowe
Newton, A. J.	Wallingford
Newton, W. G.	St. Albans, R. F. D.
Oliver, J. C.	Charleston
Parker, F. J.	Grand Isle
Parker, J. B.	Whiting
Patten, J. P.	Williston
Paine, C. S.	South Randolph
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Pierce, G. W.	Brattleboro
Powers, William	Brandon
Peck, Cassius	Burlington
Pierce, J. H.	Franklin
Pierce, C. C.	East Clarendon
Place, R. H.	Essex Junction
Peck, A. M.	St. Johnsbury
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Palmer, George	New Haven
Palmer, C. E.	New Haven
Richardson, A. E.	Burlington
Rie, Eli	West Charleston
Robie, W. C.	Franklin
Richmond, H. J.	Guilford Center
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Reynolds, M. W.	Middlesex
Robbins, Henry	Middlebury
Roberts, L. J.	Waterbury
Ruggles, E. H.	Westford
Rice, H. W.	Brookside
Rutherford, W. L.	Waddington, N. Y.
Ricker, N. H.	Ryegate
Russell, H. L.	Cuttingsville
Ridlon, M. H.	W. Rutland, R. F. D.
State Dairy Bureau	State House, Boston
Shackford, Mrs. C. J. Nelson	Ryegate
Stone, W. P.	Strafford
Sawyer, A. G.	Topsham
Stafford, Charles	Chippenhock
Spear, V. I.	Randolph
Strong, P. W.	North Pomfret
Symms, E. E.	Ryegate

Slocum, A. R.	South Burlington
Stanhope, Spencer	Berkshire Center
Stevens, S. H.	Enosburg Falls
Snell, T. T.	North Enosburg
Stiles, G. M.	Morrisville
Standard Package Co.	Board Trade Bl'd'g, Boston, Mass.
Stevens, Wm. Stanford	St. Albans
Small, Fred M.	Morrisville
Stevens, N. C.	W. Glover
Sanderson, W. L.	Milton
Sanderson, C. P.	Milton
Smith, F. E.	Montpelier
Sowles, A. P.	St. Albans
Smead, C. D.	West Brookfield
Seeley, H. M.	Middlebury
Smith, C. F.	Morrisville
Spaulding, L. C.	Poultney
State Library	Concord, N. H.
Sherburne, A. E.	North Pomfret
Stoddard, M. A.	Rutland
Smith, N. E.	Richford
Smith, Francis	Swanton
Smith, F. V.	Stowe
Smith, George G.	St. Albans
Snow, F. M.	East Montpelier
Sowles, E. A.	St. Albans
Smith, E. C.	St. Albans
Sprague, N. T. Jr.	Brooklyn, N. Y.
Smith, E. A.	Boston, Mass.
Smith, F. B.	New York
Snow, Mrs. Edward	Swansey, N. H.
Sprague, Geo. K.	E. Brookfield
Swan, P. B.	Montgomery
Scarff, C. W. Col.	S. Burlington
Storrs, A. A.	E. Bethel
Scribner, D. C.	Charlotte
Stone, E. A.	Williamstown
Towne, E. B.	Milton
Taylor, A.	Burlington
Turnbull, J. G.	Barton Landing
Tarbox, C.	Jericho
Towle, E. R.	Enosburg Falls
Thompson, Eben	North Danville
Teachout, S. D.	Essex Junction
Tarbell, E. S.	Montgomery

Terrill, G. H.	Morrisville
Tottingham, L. H.	Shoreham
Talcott, D. I.	Williston
Talcott, L. F.	Williston
Talcott, J. I.	Oakland, Cal.
Talcott, Frank	Williston
Tarwell, F.	Hampton, N. Y.
Terrill, M. W.	Middlefield, Conn.
Terrill, A. W.	Morrisville
Temple, G. H.	Randolph Center
Vail, H. W.	Randolph
Van Patten, W. J.	Burlington
Warren, S. H.	North Pomfret
Wells, Edward	Burlington
Ware, O. T.	Brattleboro
Wilcox, G. I.	Woodstock
Whitcher, J. R.	S. Ryegate
Williams, W. H.	Rutland
Wright, Will	Brandon
Wheeler, N. B.	Brandon
Winslow, C. M.	Brandon
Washburn, Chat	Brandon
Williams, N. G.	Bellows Falls
Walker, N. S.	Clarendon Springs
Wright, Ellen J.	Colchester
Woodard, J. S.	Enosburg
Wheeler, Curtis	Fairfax
Weed, E. D.	Hinesburg
Warren, Rufus	Montpelier
Webb, W. W.	S. Royalton, R. F. D.
Wheelock, H. R.	Montpelier
Walker, Willard	Montpelier
Whipple, Obed Jr.	North Pomfret
Wheeler, F. H.	Proctorville
Walker, James	Springfield
Whitney, R. W.	Springfield
Warner, J. N.	St. Albans
Waller, M. D.	St. Albans Bay
Whitney, George W.	Williston
Whitney, Ed.	Minneapolis, Minn.
Wright, H. S.	North Williston
Willard, D. S.	N. Hartland
Whitney, H. O.	Williston
Whitelaw, F. R.	Randolph

Wallace, Sidney	Waterbury Center
Weston, H. S.	Winooski
Walker, H. W.	South Woodstock
Williams, G. B.	Walpole, N. H.
Williams, J. B.	Glastonbury, Conn.
Webb, J. T.	New Braintree, Mass.
Whitman, C. D.	Fishers Island, N. Y.
Weston, S. H.	Winooski
Warner, B. F.	Burke

Note—If any of the members know of anyone on this list that is deceased or have changed their P. O. address, would confer a favor on your Secretary by notifying him of the same.

ANNUAL MEMBERS, 1906.

Allen, F. E.	S. Royalton, R. F. D.
Burr, L. R.	N. Clarendon
Bull, E.	Tinnmouth
Brockway, Henry	W. Hartford
Brockway, Dan	W. Hartford
Brown, C. P.	Woodstock
Burbank, J. A.	No. Pomfret
Bellows, F. A.	Panton
Boutwell, W. C.	Gayssville
Brooks, W. K.	St. Albans
Briggs, E. L.	No. Pomfret
Beach, H. F.	Vergennes, R. F. D.
Badger, C. A.	Williamstown
Bullis, Frank	Grand Isle
Brigham, E. S.	St. Albans
Barry, R. A.	New York, N. Y.
Bump, C. A.	W. Salisbury
Brown, R. C.	Sheldon
Blair, J. M.	W. Barnet
Bigelow, F. M.	Essex
Baker, O. W.	Waitsfield
Burnette, R. E.	Bethel
Bessette, H. C.	N. Ferrisburg
Bruce, M. R.	Passumpsic
Buell, S. B.	S. Strafford

Cummings, C. R.	W. R. Junction
Collins, F. O.	Swanton, R. F. D.
Curtis, E. O.	St. Albans, R. F. D.
Curtis, A. T.	St. Albans, R. F. D.
Campbell, Archie	So. Royalton, R. F. D.
Carpen ter, H. H.	Cabot
Cady, W. N.	Middlebury
Chamberlin, H. B.	Irassburg
Cossingham, R., Jr.	Norwich
Carrigan, J. B., ...	Pittsford
Cunningham, N. F.	St. Albans
Chapin, William	Middlesex
Cassy, T. M.	E. Corinth
Colvin, C.	W. Rutland, R. F. D.
Clifford, A. P.	N. Pomfret
Dodge, L. B.	Barre, Vt.
Davidson, Joe	N. Pomfret
Dewey, S. L.	Stowe
No. Danville Creamery Co.	Danville
Draper, F. W.	Enosburg Falls
Darling, R. F.	Newbury
Drown, E.	E. Hardwick
Davis, Fred	Bethel
Densmore, H. H.	Bethel
Doyle, C. G.	Waterbury
Densmore, G. H.	Swanton
Donahue, W. C.	Monkton
Ellis, F. W.	S. Corinth
Eddy, D. W.	Monkton
Edson, A. E.	Randolph Center
Foster, E. W.	St. Albans, R. F. D.
Fisher, D. W.	Rutland
Green, T. A.	Newbury
Gardner, E. L.	Enosburg Falls
Gordon, Edward	Grand Isle
Gallager, J. A.	Craftsbury
Grimm, G. H.	Rutland
Hallett, E. H.	St. Johnsbury Ctr.
Hathaway, F. M.	St. Albans Bay
Huggins, Austin C.	S. Walden
Heath, W. E.	Sharon
Howie, Mrs. A. F.	Elm Grove, Wis.

Hill, W. N.	Starksboro, R. F. D. 2
Hewitt, H. C.	Bristol
Hewe, W. H.	So. Royalton, R. F. D.
Howe, E. L.	So. Royalton, R. F. D.
Hayes, J. R.	Strafford
Harvey, Fred	Hinesburg
Holoren, Miss Hanna	Wardsboro
Hackett, D. H.	Albany
Hewitt, J. D.	No. Pomfret
Hitchcock, Ernest	Pittsford
Johnson, F. C.	Washington
Jewett & Son, S. N.	Middlebury
Jenne, A. N.	Richford
Kingsley, C. J.	W. Salisbury
King, Harvey	222 Summer St., Boston
Kingsley, T. D.	Rutland
Kimball, E. M.	Enosburg Falls, R. F. D. 1
Leonard, P. W.	No. Pomfret
Lyster, H. L.	Wells River
Lewis, A. L.	Rochester
Meighs, S. J.	St. Albans, R. F. D. 3
Montgomery, Roy	Warren
Merrill, H. J.	Fairfield
Miller, F. A.	S. Peacham
McIntosh, L. D.	S. Royalton, R. F. D. 1
Morse, Frank	W. Hartford
Mobus, J. W.	E. Warren
Miles, F. A.	N. Ferrisburg
Miller, E. L.	S. Royalton, R. F. D.
Merritt, H. R.	Highgate Center
Montague, J. A.	Enosburg Falls
Martin, C. D.	E. Corinth
Milligan, F. B.	Walden
McDonough, P. H.	Hinesburg
Milligan, W. B.	Newfane
Martin, C. E.	Rochester
Mix, C. H.	Montpelier
Newton, W. G.	St. Albans, R. F. D. 2
Nelson, F. B.	W. Salisbury
Norcross, W. C.	Waterbury Center

Nelson, David	Springfield, Mass., 34 Allen Ave.
Perry, S. E.	S. Pomfret
Pierce, J. H.	Franklin
Page, L. B.	Randolph Center
The Randall Faichney Co.	Boston
Ryan, D. E.	Orwell
Reed, W. E.	W. R. Junction
Russell, H. L.	Cuttingsville
Ramsdall, J. A.	Lyndonville
Ryan, W. M.	N. Craftsbury
Ridlon, M. H.	N. Rutland, R. F. D. 2
Russell, F. L.	Shrewsbury
Samson, O. D.	Enosburg Falls
Slater, D. C.	Essex Junction
Sawyer, A. G.	Topsham
Sprague, W. W.	Randolph
Sherman, E. W.	Poultney
Stuart, William	Burlington
Somers, C. L.	Groton, R. F. D.
Smith, E. E.	W. Rutland
Simpson, W. G.	Waterbury Ctr.
Stearns, H. V.	Jericho
Strong, G. W.	Oakland
Stone, E. A.	Williamstown
Seaver, Harold	Woodstock
Shumway, F. H.	Roslindale, Mass.
Sewall & Fowler	Royalton
Teer, Frank	Clarendon Springs
Towle, W. W.	Enosburg Falls
Vassau, J. W.	Westminster
Varney, W. N.	Vergennes
White, J. H.	176 State St., Boston
Wright & Son, G. H.	Middlebury
Whitney, H. O.	Williston
Wells, J. B.	Randolph
Walker, Dana B.	S. Royalton, R. F. D.
Wescott, A. J.	W. Rutland, R. F. D. 2
Whitelaw, F. R.	Randolph
Wilson, F. E.	Winooski
Weed, B. W.	St. Albans
Wheeler, W. H.	S. Pomfret

VERMONT DAIRYMEN'S ASSOCIATION.

THIRTY-SIXTH ANNUAL MEETING.

The meeting was called to order at 1.30 P. M. Tuesday, January 9th, by the President, H. C. Bruce of Sharon. Prayer was offered by the Rev. F. D. Penney, of Burlington, pastor of the First Baptist Church.

President Bruce introduced *His Honor, Mayor James E. Burke*, who extended a warm welcome to the Dairymen's and the Sugar Maker's Associations. He stated his belief that Burlington could offer greater inducements to such organizations to hold their gatherings within her borders than could any other Vermont town or city; that meetings held there would be more productive of good than those held elsewhere; that Burlington should be chosen as the permanent meeting place of the Associations on the ground of its convenience of access, the opportunities offered for display of exhibits and the large audiences of farmers which attend. He discussed the advantages of farmer's organizations, the makeup of the State legislature, and the power which farmers possessed therein if they would but wield it, and closed by congratulating the Associations on their bright prospects for successful meetings.

Mr. George Terrill of Morrisville said in response to the address of welcome:

"Mr. President, Mayor Burke, Ladies and Gentlemen:

Thirty-six years ago, a few of the citizens of our State conceived the idea that Vermont dairymen should organize to promote their interests and to enable them to produce more and better butter, to keep more and better cows, and to get a better price for their finished product. The Association thus founded, although weak and feeble and without funds at the outset, has struggled on; and through the persistent effort of these few men who started it, and their successors, aided by a liberal State appropriation, Vermont has today the largest Dairymen's Association in the United States.

Burlington has received more calls from this Association than any other place in the State. I have been a member for sixteen years and attended every meeting; and during those sixteen years we have come here four times. I feel that we have done well by Burlington in the years that have passed, and that she has always done well by us. It seems to me that in no place where we meet do we do more good to the young Vermonters than here. We find more young farmers in our Burlington audiences than anywhere else,—and it is young farmers in whom our hopes lie for the future growth and prosperity of this Association.

Mayor Burke long ago extended the officers of the Association a very cordial invitation to hold this meeting here, and Ex-Gov. Woodbury offered the free use of this hall for this meeting, one of the best we have ever had. The butter exhibit, machinery exhibit, and audience room, all in the same building, and close to the hotel, make it much more pleasant and easier to view the exhibits and attend the meetings. In behalf of this Association I extend its thanks to Gov. Woodbury, to Mayor Burke and to the city for this invitation and for this welcome which we have received.

President Bruce:—We will now listen to the report of the Secretary and Treasurer.

REPORT OF THE SECRETARY AND TREASURER,

December 1st, 1904 to December 1st, 1905.

F. L. DAVIS, SECRETARY.

Cash received as follows:

1904		
Dec. 1, Cash on hand at settlement	178	29
Dec. 8, F. L. Davis, advertisements	11	00
1905		
Jan. 10, State appropriation	1000	00
April 1, F. L. Davis, advertisements	204	50
April 12, F. L. Davis, advertisements	41	75
Nov. 8, F. L. Davis, advertisements	58	00
Nov. 20, F. L. Davis, advertisements	31	00
	<u>\$1524</u>	54
Membership fees for 1905	162	00
Total receipts	<u>—————</u>	\$1686 54

1904

Cash expended as follows:

Dec. 8, Paid W. M. Adams	\$ 50	00
Dec. 26, Paid Bogle Bros.	10	78
1905		
Jan. 13, Paid F. S. Cooley	35	84
W. N. Cady	3	10
G. L. Cushman	40	00
Orrin Bent	40	00
Geo. M. Twitchell	48	70
W. T. Becker	39	36
J. A. Ruddick	50	90
Geo. L. Blanchard	25	00
Geo. H. Wilder	35	00
Pavilion Hotel	105	75
W. E. Perkins	14	74
W. W. Miller	20	74
Mrs. Edna S. Beach for		
Women's Auxiliary	17	10

Jan. 16, Paid Brown & Moore	22	35	
Jan. 23, Paid Vt. Watchman Co.	128	00	
Jan. 28, Paid J. F. Cowern	7	00	
Feb. 28, Paid Emma Grout Nutt	57	00	
Mch. 18, Paid J. F. and W. C. Donahue....	1	50	
April 12, Paid W. M. Adams	18	20	
May 31, Paid F. L. Davis	53	13	
Aug. 7, Paid W. M. Adams	50	00	
Aug. 31, Paid Free Press Association	75	00	
Nov. 16, Paid Free Press Association	14	00	
Dec. 1, Paid F. L. Davis, Secretary, salary and other expenses	205	75	
W. M. Adams	25	00	
Transferred to Premium Fund	256	00	
Dec. 4, Paid M. A. Adams	21	65	
Total expenditures	1471	59	
Cash on hand	214	95	
Total			\$1686 54

PREMIUM FUND.

Received from different sources:		\$742 28
Expended for premiums	\$652	20
Paid express on butter	31	05
Paid for extra butter and cheese	18	00
Paid incidentals		55
	701	80
Cash on hand	40	48
		\$742 28

F. L. Davis:—All these vouchers have been audited and approved by the Association's auditor, Mr. C. F. Smith of Morrisville, as well as by the State auditor.

President Bruce:—Members of the Association, you have heard the report of the secretary and treasurer. What shall be done with it?

Moved by Mr. Northrop, seconded by Mr. Aitken, that the report as read be accepted and adopted. Carried.

PRESIDENT'S ADDRESS.

Members of the Vermont Dairymen's Association, Ladies and Gentlemen: This thirty-sixth annual meeting of our Association has now convened in the Queen City of our State upon invitation of His Honor, Mayor Burke, and we have been accorded most excellent accommodations for our meetings and exhibits through the courtesy of Ex.-Gov. U. A. Woodbury. We feel assured that this meeting will excel all others in point of attendance, enthusiasm and practical helpfulness.

How quickly the year of 1905 has passed! It seems but a day since we were in session at Montpelier. How well we remember that meeting with its large attendance, its interesting exhibitions of dairy products and of dairy and farm machinery. More than this, we remember the practical and pointed papers to which we listened, the animated discussions which followed them, and the close and enthusiastic attention on every side. Many of these subjects have been discussed over and over again in our Granges, our Farmers' Clubs,—yes, and in our homes and places of business as well. Many of us have applied the improved methods there advocated to our farm work, to the care of our stock and to the handling of our dairies and creameries. All this agitation and stir is a sure indication of growth,—the teaching of the farmer is but a preliminary to the improving of the farm and the things pertaining thereto. Careful examination of reports and statistics for the year will fully bear out the statement that "Greater progress has been made by the farmer during the year of 1905 than ever before." Why! the estimated value of dairy products of the United States is \$665,000,000, or \$54,000,000 more than the year before; poultry products, too, are valued at more than a half billion dollars. The total wealth production on the farms amounts in value to more than \$6,415,000,000.

These estimates are for the whole country; but have not Vermont farmers shared proportionately in this progress and prosperity? Most certainly they have; information obtained from the State press, from observation and from various other sources prove this conclusively. *Never* has there been such a showing for the farmer as at present. We are surely having a more intelligent, a more intensive agriculture; buildings, as well

as farms, are being improved; education is becoming more of a necessity and the farmer's life instead of being a life of drudgery and disappointment is fast becoming one of the most broadening, most interesting and most health giving. The farmer is realizing more and more his importance to the world at large and the complaining and unrest which have been so noticeable in the past are fast passing away, we hope and trust never to return. Haven't you noticed a change in the very atmosphere about the agricultural portions of our State? Hasn't there been less complaining and distrust around your factories? Haven't you met with fewer discouragements in your dairying and in the marketing of your produce? Indications are that we shall all be optimists in the near future; certainly pessimism should never be allowed to gain a foothold in our homes or places of business. Obstacles bravely met can be overcome.

"Beyond a forest deep a mountain stood,
So high that every pilgrim, taking fright
At its stern brow, returned into the wood,
Crying 'I *cannot* scale the *awful* height!'

But one of *stronger purpose* made a start;
When he had come unto the mountain bold,
He *drilled* a level passage through its heart—
And lo, the frowning cliff was gleaming gold."

Not muscle alone you see, but a well developed and well disciplined *mind* and *purpose* directing healthy and well developed muscles accomplished the desired end.

I saw a very apt quotation in the New England Farmer a short time ago from the Rev. Geo. F. Pentecost, which gives the farmer the place he must fill. "The keys of heaven may have been given to Peter, but certainly the farmer holds the keys of the earth. The men who hold the farms of this country hold in their hands the destinies of the nation." Now if this be true, that the farmer holds in his hands the destinies of the nation, then it behooves him to look to it that he perform well his part. Let him stand where he ought on the subject of education. Our common schools should be of the best and it should be made possible for our boys and girls to obtain a thorough knowledge of agriculture in them so that, if they are inclined to that line of work, they may be encouraged in it.

In these days of close competition and specialization we need to study the bent of the child; there is no use trying to make a natural mechanic into a farmer, as the result will be a misfit and probably a failure; but we ought to do all we can to instill in

him an intelligent liking for the farm and farm life and a thorough knowledge of the principles that underlie success in that line of work. *Education* and education that is *practical* is what the farmer must have.

Make use of our State Agricultural College, if practicable; it has done and is doing an increasingly good work, and many have gone out from it to fill places of importance in the world. The new Agricultural building, for which an appropriation was made by the last Legislature, has not been built as yet, for the reason that the most desirable location for it could not be obtained at a reasonable price. It is expected that some site will be obtained and the erection of the building commenced in the early spring. The attention of this Association is again called to the helpfulness of a correspondence course in connection with our Agricultural College. When the new building is completed and equipped, then a request for the aforesaid course may receive the consideration of the University trustees. *Let us bear this in mind.*

Agricultural Fairs.—I believe that our Association should encourage them as educational factors. We find upon examination of the recent pamphlet issued by Hon. G. W. Pierce that there are one hundred and sixty-five fairs held in the New England States; seemingly too many for the best results to be obtained. Moreover, that in all these states, except New Hampshire and Vermont, State appropriations are made to aid in the work. Now why do these states make such appropriations if they do not consider the gain to the agriculturist commensurate with the expenditure? State aid would of necessity mean more stringent rules and regulations regarding the management of the fairs, hence many of the objectionable features would be eliminated and the educational element made more and more prominent.

Free seeds are now being termed a nuisance by some of the agricultural papers, and seedsmen are protesting against them as a restraint to trade and as class legislation. The majority of farmers, I am inclined to think, consider them hardly worth planting; to me it seems an expenditure of money, which, used in some other way, would be of much more benefit to the agriculturist. It is claimed that 40,000,000 distinct packages of seeds are sent out each year in that way,—postage free, more than are annually sold by all the seed establishments of the United States.

It is also well for us to note some of the objects for which the Granges of our country are working: namely, parcels post, national and state aid for the improvement of public highways, railway rate legislation, etc., etc., and see where we, as an Association, stand in matters which so plainly are of vital interest to all farmers.

All through the year prices for dairy products have been good,—exceptionally so considering the large increase in butter production over 1904. The summer of 1905 was one of cheap production too, as grazing was the best for many years, necessitating a smaller grain ration than usual and thereby minimizing the cost of food. Owing to the increased amount of storage butter, prices probably will not go as high this winter as last, but the outlook is fairly good, all things considered.

It is very gratifying to us as an Association to note the continued and continuing development, improvement and prosperity of the farmers of our beloved Green Mountain State, and to feel that we have done our little toward bringing this to pass. But we gladly recognize other potent factors in this development, first among which I might mention the Granges; the State Grange, with our most excellent governor as its Worthy Master, the Pomona, and the local or subordinate granges scattered throughout the State, in all of which the best and most modern ways of dairying from the selection and care of the dairy herd to the marketing of the finished product are discussed and assimilated. And yet, as in our Association, it is not the discussion alone, but the banding together, the organization, the union of purpose, which makes the work of the Grange so powerful for good. In connection with this subject of organization, Dr. Austin Peters says: "The farmer is the only man the community cannot live without and the only man who can live long without help from the rest of the community. If farmers could organize and strike, they could bring the rest of the country on its knees to them within three weeks."

The agricultural press should have a prominent place among the factors which have greatly helped to produce the present prosperity. Each year it improves upon its mission of disseminating the knowledge most useful to all who are in any way interested in the work of the farm.

The *state institute work* which has been so ably carried on has brought awakening and encouragement to many.

As late as ten years ago it was prophesied that the creameries of our State would live but a short time, that they were extravagancies which the farmer could not afford to support. Instead of this prophecy coming true, they have become the backbone of the dairy industry. Do you doubt it? Let us think for a minute of a small, well-equipped, well-managed creamery in one of our little towns,—a creamery doing, we will say, a \$25,000 business annually. The work is done in a *systematic business-like* way,—a wholesome spirit of competition is encouraged in order to secure the most and best from each patron; the product is handled and packed as neatly and attractively as

possible to secure the best customers. All the scientific work of the creamery is open to inspection,—separating, ripening cream, churning, testing, daily work of machinery, packing, etc., etc. The financial benefit of the regular monthly payment is worth noting. See what is encouraged in the farmer: System, neatness and carefulness in preparation of the product for the market, a study of the scientific part of the work, regularity and promptness. It must be with this as with all other lessons,—“Here a little, there a little,” but the lessons are being learned and applied.

Now a word of the Ladies’ Auxiliary which was organized in this city as a part of our Association, Jan. 10, 1894. It has done well its part toward making the work effective and has added greatly to the interest of the meetings. It now numbers one hundred and thirty-three members, and we hope that it will *continue to increase in membership and in interest*, for we believe that the support and encouragement which our wives and daughters have accorded us in the meetings and in our homes have done much toward making the Vermont Dairymen’s Association the largest and most popular dairy organization in the country.

In conclusion: The work of this meeting has been laid out after careful thought, and the topics put upon the program are pertinent. The speakers who will address you are experts in the several lines of work taken up and will entertain, enthuse and instruct. Let us have a full attendance upon all these meetings and let us ask questions freely in order that the most possible good may be obtained. Then when this convention shall come to an end and we shall return to our several places of business, we may take with us so many of the good things and so much of the fire, that we may be able to enthuse those who could not meet here with us, and to such an extent that agriculture and all pertaining to it shall show even more gain in the coming year than in the past and the *strength and helpfulness* of this Association be greatly augmented thereby.

(Applause.)

THE CREAMERY MAN AND HIS PATRONS.

F. L. SMITH, FLETCHER, VT.

President Bruce:—The next speaker is a practical farmer and a practical creamery man. He understands thoroughly the creamery business and the creamery man, as well as those things which come up between the creamery man and the patrons to cause trouble. He will address you upon the subject of the creamery man and his patrons. I take great pleasure in introducing Mr. F. L. Smith of Fletcher.

It is admitted that the prosperity of our State depends upon its farmers. Our president has just told us that the prosperity of the whole country depends upon its farms. It is also true that there is close connection between the prosperity of our Vermont farms and the success of our dairies; and everyone who keeps a dairy, whether he makes butter or cheese on the farm, or patronizes the creamery or factory, is helping to increase that prosperity.

It is often said, particularly in the papers, that while there has been great improvement in other industries, there has been but little advance in farming methods. This is a libel upon the Vermont farmers. One has but to look back twenty years and compare the dairying of 1886 and 1906 to realize its falsity. I do *not* claim that we have reached the goal. Many are far behind, in the old rut, stuck in the mud as it were, but I do say that as a whole we are on the upward path.

The dairymen of today are far more prosperous than they were twenty years ago. They have the necessities even the luxuries of life. They come to the Dairymen's Association, and have been known to tip waiters at the banquet with five dollar bills.

Now, if there is one thing more than another that has helped to bring about this state of affairs, I believe it is the creamery. Not simply the creamery men, but "the creameryman and his patrons." I never saw a successful creamery without patrons. In fact, when the patrons commence to drop off, the creamery begins to go down.

Where two parties have to work together as the creamery man and his patrons do, they ought to work in harmony for the upbuilding of their mutual interests. They ought not to feel that

one exists merely for the convenience of the other when the facts of the case are that they are partners in the business and that what is for the interest of one is for the interest of the other. It is a pleasure to note that the ill feeling which existed in these meetings a few years ago between the private dairyman and the creameryman has disappeared. This is as it should be. There is room enough for us all. The man who believes that it is for his own interest to make his butter and cheese on the farm should do so; and the man who believes it is for his interest to either manage or patronize the cheese factory or the creamery should do so; and there should be no ill feeling between the two. The same good feeling which prevails between the private dairyman and the creameryman in these meetings ought to prevail between the creameryman and his patrons. But that it does not exist in very many cases is evident.

Trouble is most likely to occur between the creameryman and his patrons on account of four points of contact, viz.: the skim milk, the care of the milk or the cream, the price and the test.

Skimmilk. I never had serious trouble with my patrons on this score. My creamery is changed from a milk to a cream gathering one, so the question is practically settled as far as I am concerned. It is however the most disagreeable and aggravating trouble that besets a creameryman. It seems almost inconceivable that men who would not think of taking anything else will take from each other a thing of so little value as skimmilk; and of course, they expect that the creameryman will make it hold out.

Care of the milk and cream. I divide patrons into three classes,—the careful, the occasionally careless, and the careless patron, or as I sometimes think of him, the don't-care-patron. The careful patron's milk and cream are always in good shape, clean, well cared for. It is a pleasure to receive it. Let him know that you appreciate his way of doing things. He deserves it. It will be an encouragement to him to know that you notice such things. It will help him and lead him to go on and do even better.

The occasionally careless patron will not trouble you much. His milk and cream are all right, but occasionally, when hurried with work, as all farmers are at times, he will forget to give them proper care, and you will get a bad lot of milk or cream. You will probably have to remind him occasionally that he must be more careful.

The careless patrons seem to think that "any old thing" will do for the creamery. They will not strain their milk. They put in the first rinsings of the milk pail,—I suppose so as to get all

the dirt. They use the unwashed milk pail to catch the cream. I have even known one to set a covered twenty gallon can under the separator, to run a rubber pipe from the cream spout down through the vent hole of the cover and to leave it there, running the cream in from several separations until the next gathering occurred. They wash the separator once a week, possibly; I am not sure that they do it then.

We hear much about education along these lines, that we must teach them the wrong of such actions. I am tired of that kind of nonsense. It needs something more stringent. Education is all right in its place, but is no remedy for nastiness. A good dose of refusal does that kind of patron more good than all the talking you can do in a year. As long as you will take that kind of stuff, you will get it, but when you commence to cut it out you will get it in better condition. Somebody says "I know the stuff isn't fit to take, but my competitor's team runs right by their door, and if I refuse it, they will leave me and go to him." If it comes to that, let his competitor have it; but in nine cases out of ten they won't leave you; and in ninety-nine cases out of a hundred, it will prove to be just the thing that was needed. The point is right here: If you refuse a bad lot of milk or cream, he knows enough to realize that it is bad, and will not risk refusal or his reputation,—if he thinks he has got any,—by offering it to another party. If he has any pride, you have aroused it by telling him of the facts; and if he hasn't the sooner you find it out and are through with him, the better.

The test and the price. The most senseless thing a creamery man ever did was to cut his patrons' test for the sake of raising the price. The test is at the bottom of much of the patrons' distrust of the creameryman, and the latter is largely to blame. Many of our patrons are intelligent; they take pains to know what their milk and cream ought to test and are on the watch for us. They want pay for the last point there is in it, and some even more. I verily believe that if you should give some patrons the whole world and fence it, they would want the sun, moon and stars thrown in.

Some one says "My competitor uses those methods; I must or go out of business." I know better. No man has to go out of business because he uses square business methods and does business in a square, business-like way. The sooner that we get down to a straight business, and do business honestly and squarely and in a businesslike way, the better for us as creamerymen, and the better satisfaction it will give our patrons. Make your test honestly and make your price come to it. Don't make your price and then fit your test to it.

It is not all plain sailing in the creamery business ; but whatever comes up, keep good natured. It will pay you and you will feel better about it. You may have to speak plainly sometimes, but control your temper. You hear about folks freeing their minds, but it doesn't work that way. You lose your self-respect as well as the respect of your patron.

DISCUSSION.

Mr. Eddy:—Do you grade cream and pay for it according to its sweetness?

Mr. Smith:—I do not. It would be more trouble than it would be worth, considering the size of my business. I do not take cream unless it is good enough to make first-class quality of butter. A patron can make that kind of cream if he will.

Mr. Wallace: Is there a creameryman here who grades his cream? If so, how does the scheme work?

Mr. Brown:—I am a creameryman representing Hood & Sons. We have just started doing business in Woodstock, and grade our cream. The conditions were such that it was an absolute necessity. There had been two creameries there, and apparently so much rivalry between the two that they would take anything that was brought to them. When we first began there we were receiving cream anywhere from two to ten days old, and in almost all conditions. We pay three cents more a pound for the high grade cream. The scheme is working very well. I think that about two-thirds of the cream is coming in sweet condition, whereas the first of last July probably less than a fifth of it was of this grade.

Mr. Smith:—I do not object if the cream is not sweet when gathered. It is the bad taste that I object to. If it has a little acid taste, as far as my experience goes, it is not injurious to the butter.

Prof. Decker:—How much acid do you find when you test for acidity?

Mr. Smith:—I never tested it for acidity.

Prof. Decker:—You miss an important point. If you get over-acid cream, you will get butter that is old in its taste and flavor.

Mr. Smith:—I presume so, but practical results are what I have always looked at more than the other part of it. Cream that tests from 30 upwards, may get with safety quite sour, whereas one testing 20 percent or so cannot. I cannot tell why, but I

know that cream which has a large quantity of milk in it cannot safely get sour as can thick heavy cream.

Mr. Eddy:—We have started in gathering cream in rather a small way. I selected a large dairy supplying mostly cream throughout the year. We pay an extra price, several cents more a pound for butter fat than we could pay everyone, because of the improved quality of the product, kept cool, delivered sweet, and cream testing 40 percent fat. We get a better product because there is less of the milk serum left in the cream. It is the milk sugar it contains which sours. The thicker the cream the less the sugar and the slower the souring. We put a starter into this thick cream and control the fermentation. It churns more readily and at a lower temperature, the grain of the butter is better and the buttermilk is low in fat. So we gain all around in handling thick cream.

Prof. Decker:—Some western plants class their cream in three grades. Number one is cream that tests 30 or more percent fat and carries 0.20 percent or less acidity. If it tests less than 30 percent, though sweet, or if it carries more than 0.20 percent acid, though carrying 30 percent fat, it grades second class. Cream of bad flavor, of 0.20 percent or more acidity and with less than 30 percent fat goes into the third class.

A Member:—What is the standard percent of gain at the churn?

Mr. Smith:—Ordinarily about 18 percent on cream, varying a little one way or the other. I have seen it as low as fifteen percent, and one month this fall,—I don't know why—it ran as high as 22 percent.

A Member:—What method do you use in drawing samples of cream for testing?

Mr. Smith:—I weigh the samples of cream.

Prof. Decker:—How do you get your sample from the farmer's can of cream?

Mr. Smith:—I use a small tube of about half an inch in diameter which I drop into the can.

Prof. Decker:—Prof. McKay of the Iowa State College sent me a cream sampling tube last summer which is the best and only thing that I have come across that is really satisfactory. It consists of two tubes, one inside of the other, each with the slot down the side. It is lowered into the cream with the slots closed. A turn of the wrist brings them together and open. A core of cream is thus taken. Another turn of the wrist the slots close and the sample may be withdrawn. Some cream is so thick that it will not run up into a tube, but the sample enters this tube through the slots on the side and then, the handle being turned,

the cream is left there. This device will be on exhibition here tomorrow.

A Member:—Do you pour cream from one can to another before you sample it or do you insert the tube without pouring? Pouring a can of cream into an empty can and back again before taking the sample is the customary practice in Connecticut.

Mr. Smith:—If more than one weigh can is full, we usually wait until it is in the large cans on the team before we take a sample; otherwise we take it in the weigh can after it has been poured.

Prof. Decker:—What do you take your sample in and how often do you test?

Mr. Smith:—In a bottle. We test twice or thrice a month.

Prof. Decker:—Do you test each sample you get or composite them?

Mr. Smith:—We composite them.

Prof. Decker:—Don't it vary as it comes from the separator?

Mr. Smith:—I presume so. We take a sample every time we gather.

President Bruce:—Members of the Association, Ladies and Gentlemen, I have the very great pleasure of introducing to you Prof. H. H. Dean, of the Ontario Agricultural College of Guelph, Ontario, who will now address you.

CHEESE VS. BUTTER MAKING.

PROF. H. H. DEAN, GUELPH, ONTARIO.

Before I take up my topic proper, will you allow me as a Canadian to say one or two things of what we are doing in Canada? We are not so large in population as the great American Republic,—we are only five and a half millions of people in Canada, yet our dairy products last year have been estimated as being worth \$80,000,000, or about fifteen dollars for every man, woman and child in the Dominion. We exported about \$30,000,000 worth made up in round numbers of \$22,000,000 in cheese and \$8,000,000 in butter. The average price per pound received for export cheese has been about 10½ cents, that for butter 21½ cents. In spite of the high tariff wall on each side of the border line, we sold last year to the United States goods of all kinds to the value of about \$77,000,000 worth. We bought from the American Republic about \$163,000,000 worth. We sold to the Mother Country, Great Britain, about \$102,000,000 worth of goods and bought from her about \$60,000,000 worth of her manufactures.

The key note of the dairy business at the present time with us is cooperation and economy. I was forcibly struck with that fact this last summer when visiting the different dairy countries of Europe as well as Great Britain and Ireland, and especially Denmark. I found that cooperation and economy in that country carried to a point such as is not to be found in any country under the sun so far as I know. The farmers in Denmark own their creameries, their collecting and exporting establishments, their bacon-curing establishments,—in fact, everything, every great farming industry in that country is owned and managed by the farmers. Let me give you one illustration regarding the economy which is practiced in their bacon-curing establishments. The farmers not only fatten the pigs which they take to the establishments, but every scrap of meat, every bone, every particle of that animal is turned into something of value. It is, I believe, the boast of the American bacon establishments that they make use of everything in connection with the hog except the squeal. The Danes are going you one better; they are trying to enter into negotiations at the present time with Scotland to import the squeal for use in the bagpipes.

I said a minute ago that cooperation and economy are the key notes of successful dairying in Canada. Practically all of our cheese and butter are made in the cooperative factories. This is perhaps not true to the same extent here, so that possibly what I shall say will not have as direct a bearing upon your dairy work which it might otherwise. Yet I think the principles are the same whether practiced or followed in Canada, the United States, or Denmark or any other country.

Now, my subject is Cheese Making vs. Butter Making. First let us look at the points of similarity between them.

POINTS OF SIMILARITY.

Both cheese and butter making require that the farmer or milk producer shall have good cows. By a good cow we understand one which produces not less than 6000 pounds of milk in one year, if making cheese be the branch followed, and one that produces not less than 250 pounds of butter, if butter making be the chief line followed. To state it in another way a cow should earn over and above the cost of her feed not less than twenty-five dollars per year. She may go as much beyond these figures as she likes, but these are the minimum or lowest amounts allowed.

In both, cheap and suitable feed are necessary. It is feed that makes the cow milk. Generally speaking, we should recommend grass, clover, corn silage, mangels, bran, crushed oats, pea-meal, and a small amount of the concentrated feeds, such as linseed cake, cottonseed meal, gluten feed, etc., as being suitable feeds for milk production. Our own practice is to give little or no meal during the summer when the cows are on good grass. If supplemental feeds are necessary, we use bran, corn silage, and green feed in the form of peas and oats or corn, 8 to 10 pounds cut clover hay, 20 to 30 pounds pulped mangels (all of which is mixed together for some time before feeding) together with about 8 pounds of meal daily per cow. The meal consists of 4 lbs. bran, 3 lbs. ground oats and one lb. linseed cake.

An experiment comparing 4, 8, and 12 pounds meal daily per cow, conducted during January, February and March, 1905, in the stable at the Dairy of the College gave the following yields and costs for milk and butter:—

Lbs. meal.	Av. daily yield per cow. lbs.	Av. per cent fat.	Cost of 100 lbs. milk.	Cost of 1 lb. Butter.
4	23 1	3 56	45 4	11 0 c
8	25 7	3 46	51 4	13 0 c
12	26 2	3 46	68 1	17 0 c

The smaller amounts of meal gave the most economical returns, but in order to maintain the milk flow, we should recommend the medium (8 lbs.) meal ration.

For both cheese and buttermaking, the raw material, milk must be properly cared for and be delivered to the manufacturer in good condition. The two chief points in caring for milk or cream on the farm are:

1. To keep everything as clean as possible, and
2. To keep them as cool as possible. Any condition or set of conditions which accomplishes these results will be satisfactory. Anything which violates these principles leads to disaster.

But I reiterate, both cheese and buttermaking require that the farmer shall have good cows. We are trying to preach that doctrine in Canada. At the present time we have a regular crusade, trying to get the farmers to have better cows. And there is just one way to get better cows, and that is to weigh and test the milk. Now, personally, I would not give a snap of the finger for form in a dairy cow. Some of you I expect will jump on me hard; but I know from practical experience that there is not a man or a woman who can go into our herd of cows or any other herd and pick out the money making cows by their form. What we need is to have the milk of these cows weighed and tested so that we will know just what they are doing. I say to our boys, "I care not so much for form in the dairy cow; what I want is a cow that will perform." Give me cows that will *perform*, and I care not what their *form* is, unless I am breeding pure-bred dairy stock. Then I must, to a certain extent, pay attention to the form, color and so on; but I am talking now of dairy cows, cows for making money.

We keep a herd of 20 or 30 cows at the Agricultural College at Guelph, comprising three different breeds. The records for this last year show that two of our cows gave over 10,000; 4 over 9000; 6 over 8000; 8 over 7000; 12 over 6000 lbs. of milk; then three of them gave over 400 pounds and ten over 300 lbs. of butter; and that four of them made us \$100 profit over the cost of the feed.

You must give your cows plenty of good feed of the right kind. A great many people are looking for a cow that will make a large quantity of butter or cheese on a small amount of feed. Did you ever see any men like that? Did you ever hear of old Deacon Hackett? He was a close fisted chap, and his wife, one of these long, lean, rasping tempered women. In due course she died,—and it is hoped went to heaven. The old deacon went to the local tombstone dealer to buy a stone and directed the following inscription be placed thereon. "Susan Hackett. Lord, she was Thine!" The old deacon had screwed the dealer down

so on the price that he could only have a very narrow stone, and when he came to put the inscription on he had to leave off the last letter of the last word. The following Sunday, after service, when the people went out to see the stone that the deacon had set up, they were amazed to read,—“Susan Hackett. Lord, she was thin!” Some men’s cows remind me of that epitaph.

These cows must be kept in a good stable which (1) must be so constructed that it can easily be kept clean; (2) must be well lighted and (3) well ventilated. If you have those three things, and add to that convenience and comfort, you have got the whole thing about a dairy stable.

POINTS OF DISSIMILARITY.

The farmer’s storehouse of fertility, the soil, is not robbed in butter making as in cheese making. This is no doubt a main reason why the shrewd Vermont farmers follow butter making instead of cheese making. We have not learned this lesson so well in Canada as have the thrifty New England farmers.

Only one compound—fat—is taken from the milk in butter making, the remaining parts being available for animal feeding. Two milk constituents are used in cheese making, one of which—casein—contains that most valuable element, nitrogen, which is essential in maintaining soil fertility.

This leads me to speak of the third dissimilarity, viz.: Patrons of cheese factories should receive their share of the proceeds of sales on a slightly different basis from that followed in Creameries. We have already indicated wherein the difference lies. One part, and one part only, of the milk is needed for manufacture in butter making; and this part, the fat, naturally forms the basis of dividing proceeds among patrons of creameries. We have a different problem, however, in cheese making. Here, two milk constituents are utilized and it would seem to be logical that these two constituents should form the basis of the division of proceeds among those contributing cheese making material. If all milk were of the same composition and all milk sellers were honest, there would be no need of milk tests.

The following table shows briefly some of the results of experiments made during five years at the Dairy of the Ontario Agricultural College, with milks containing different percentages of fat for cheese making.

It is assumed that patrons receive ten cents per pound net for cheese.

% Fat in milk.	Lbs. cheese per 1,000 lbs. milk.	Lbs. cheese per lb. fat in the milk.	Value of 1,000 lbs. milk dividing proceeds according to:			
			Lbs. milk.	Lbs. fat.	Lbs. fat and casein.	Actual cheese made.
3.2	90.3	2.80	\$10.61	\$ 8.08	\$ 8.90	\$ 9.03
4.2	106.7	2.53	10.61	10.61	10.61	10.67
5.2	121.2	2.32	10.61	13.14	12.32	12.13

NOTE.—In calculating the fat and casein it is assumed that the percentage of fat + 2 represents the available fat and casein for cheese making.

I said before that for butter making one constituent is taken from the milk, and for cheese making two; and let me say right here that both in Canada and in the United States we are wasting untold thousand dollars' worth of the most valuable food ever made by nature through our inadequate use of skim milk. The time will doubtless come when we will know how to make a better use by this by-product than we do to-day.

METHODS OF MANUFACTURING CHEESE AND BUTTER.

It is not our purpose to deal with detailed manufacture, but simply to state that to make a fine Cheddar cheese we require clean, sweet milk made into cheese with as little acid as possible and that the cheese shall be ripened at as low a temperature as possible consistent with economical results for at least three months before being sent to the consumer.

In the making of fine butter, the main features are to manufacture it in the shortest time possible after the milk leaves the cow, and with as small an amount of acid as practicable in the cream at the time of churning. Sweet cream butter is growing in favor. The manufacturers of extractors, etc. fifteen years ago were on the right track, but there was "the missing link." This "link" has now been supplied by the application of pasteurization in the making of butter.

I am thoroughly convinced from experiments on that point that we can make a quality of butter, which will suit the people who will pay the highest price for this butter, better than we can by ripening the cream. I think I hear someone say, "What about this butter,—will it keep?" I would answer, "We should never make butter to keep; we should make it to eat." Then, too, we have demonstrated that such butter will keep. We have sent two boxes of this butter to London, England, the greatest market for food products to be found anywhere in the world, and the report has come back that it arrived in perfect condition.

RELATIVE PROFITS.

Cheese making has no doubt paid the majority of our farmers in Canada better than butter making, hence the marked development of this branch of dairying. Butter making, however, is bound to be relatively more important in the future as the soil becomes impoverished and the butter by-products are used to greater advantage. We also need to learn how to make fine butter of uniform quality all the year round.

It has been estimated that the average price per pound received during 1905 for export butter has been $21\frac{1}{2}$ cents and for cheese $10\frac{1}{2}$ cents. The milk that will make one pound of butter will make on the average $2\frac{1}{2}$ pounds of cheese. Without considering the by-products, the relative returns from butter and cheese this last season have been $21\frac{1}{2}$ cents and $26\frac{1}{4}$ cents, or roughly as 1 to $1\frac{1}{4}$.

When we come to consider the relative values of butter and cheese by-products, we are met with difficulties. It is one of these questions which it is practically impossible to decide definitely as so much depends upon circumstances. However, if we allow five cents as the value of the by-product from making one pound of butter, and one cent as the value of the whey from $2\frac{1}{2}$ pounds of cheese, we shall not be far astray. Figuring on this basis, we shall have, assuming that average milk makes four pounds of butter per 100 pounds,—\$1.10 as the returns from one hundred weight of milk made into butter and \$1.09 as the returns from the same weight of milk made into cheese. We should therefore conclude that so far as the cash returns from the two systems is concerned, there is not much difference. Butter making, however, always has two advantages over cheese making. It enables the farmer to rear better stock and is less exhaustive on soil fertility.

We may sum up the whole question by saying that either cheese or butter making will pay well. In direct cash returns, the making of cheese, in most cases, is more profitable than butter making. Taking into consideration the greater value of the by-products from making butter, this branch of dairying is likely to be more profitable.

Let me say in conclusion that to the people who will give attention to dairying, to the man or the woman who will give to the dairy cow intelligent care and intelligent feeding, who will give to the manufacture of milk into butter or cheese the intelligence which is required in order to make a first class product, there is no other branch of farming in Canada or the United States which will pay like dairying.

DISCUSSION.

A Member:—What breed of cows do you keep?

Prof. Dean:—Our herd consists of Holsteins, Ayrshires, Jerseys and a number of ordinary grade cows. We have to keep these several breeds for educational and experimental purposes.

A Member:—Which does the best as judged by the tests that you have actually made?

Prof. Dean:—We are getting on very dangerous ground; but I have no hesitation in saying to our people at home—for there is no use beating about the bush,—that so far as our own experience goes, we have found Holsteins to be the best cows, both in production of butter and of milk.

A Member:—What roughage do you feed?

Prof. Dean:—From 30 to 40 pounds of corn silage mixed with rough hay, clover when we can get it, and 30 pounds and upwards of roots.

A Member:—Do you weigh your roughage?

Prof. Dean:—We weigh one or two times a month or as often as the herdsman thinks necessary in order to get at what each cow is doing.

Mr. Drew:—Do the cows that give the most milk and butter get more food than the other cows?

Prof. Dean:—Yes. Each cow is charged \$5 a season for pasture. This is charged to every cow, good, bad and indifferent, big and little, because there is no way of getting at how much a cow eats at pasture. The silage, hay, roots and the meal are weighed once or twice a month. The silage is charged at \$1.50 a ton; hay at \$6; roots at 7 cents per bushel of 60 pounds. Bran costs us now \$16 a ton—it has been as low as \$12 and as high as \$20. Oats cost on an average about \$20 per ton. Oil cake usually runs from \$28 to \$32 a ton,—it is now worth \$32. These are the figures used as a basis for these calculations. The cow that gave the largest milk yield cost us \$47.33 for her feed last year. The lowest cost was \$22.12. The feed is charged up to the cow just the same when they are dry.

Mr. Peck:—You know the income from each of the cows?

Prof. Dean:—The first cow gave us a profit of \$117.18 over the cost of food; the second, of \$118.16—it cost less for the feed of the second, hence a little more profit;—the next, \$112.56. Milk sold at four cents a quart used as a basis of calculating profits.

Mr. Peck:—What was the income from the cow costing \$22 to feed?

Prof. Dean:—\$34.30 on the milk; on butter, only \$2.19. Let me tell you how this is reckoned. We buy from six to ten thousand pounds of milk a day from the farmers and use it at the present time for students to work with, and in the summer time for experimental purposes, paying varying prices for a pound fat in milk or cream delivered at our dairy. It went as low as 18 cents in the summer time. The profit on butter is reckoned on the basis that we pay farmers for fat delivered at the dairy.

Mr. Aitken:—Are the results obtained at the Central Experiment Station at Ottawa the same as those you have just mentioned?

Prof. Dean:—They have no Holstein cows so far as I know. I believe their Ayrshires have given the best all round results. I am speaking from my own practical experience with three breeds. I don't advise you to change your breed of cows. There is more difference between individual animals of the same breed than between animals of different breeds. It is more a matter of individuality than of breed.

A Member:—You make the statement that you care but little for dairy form. It is given a good deal of consideration here. What points would you take into consideration if you bought cows without knowing anything about what they tested?

Prof. Dean:—We have recently adopted the rule when buying the pure bred cattle of the dairy breeds of buying none but animals which have been what we call in our country "officially tested." There is provision made there that any man who owns dairy cows may have them tested by a disinterested person. I have but little faith in tests made by private individuals. Consequently in answering that question, I would say that I would buy no pure bred cow and pay no fancy price, regardless of weight, form or color, unless her owner can show that she has a satisfactory record. We have any number of these tests being made at the present time for cattle owners by independent authority, and I think you should have some such system here. When it comes to cows of no special breeding, then you must, if you can, get information from the owner. Usually you cannot. And if you do my experience in this,—if a man tells you that she will give six gallons in a day and four pounds of butter, you can cut that in two right on the start. If you are able to get any accurate or reliable statement as to what the cow can do, then there are certain things, of course, that you will be guided by, such as the development of the udder, etc. I believe, however, that there are very few persons who can go into any herd and point out just what cows can do the best.

Mr. Drew:—About picking up the dairy bred cow on your own judgment. Any signs about her?

Prof. Dean:—Very few. I should want the owner to tell me what this cow can do. That would be my guide. On perform rather than form I should lay stress.

Mr. Peck:—Returning to the cow that was kept for \$22; did she have the eight pounds of grain the others had?

Prof. Dean:—We feed each cow grain according to her milk and butter yield. We keep adding a little to the cow's meal and if she responds we add more; but when we find that she responds no further we stop. We give every cow according to our judgment the amount of material she can probably use.

Mr. Peck:—You have stated the profits from selling the milk at four cents per quart. The average dairyman throughout the State of Vermont cannot get four cents a quart for milk. How would the account have stood if you had taken ordinary butter prices as the basis of calculation?

Prof. Dean:—I explained that we buy milk and cream throughout the year, and that the lowest price paid for fat is 18 cents, and the highest 25 cents. The profit on the butter from this best cow was \$40.06; on milk sold at four cents it was \$118.16.

A Member:—What did the Holsteins test for butter fat?

Prof. Dean:—The cow that gave the largest quantity of butter, averaged 3.8 percent. She tested over 5 percent in one of her monthly composite tests. I think the lowest Holstein test was 3.2 fat.

Mr. Aitken:—As to the Professor's attitude in the matter of dairy form. I found on a recent visit at the Ottawa Experiment Station that they were experimenting with many different breeds, Holsteins, Guernseys, Ayrshires, Jerseys, two families of Shorthorns and the Canadian cow as well. They were trying to evolve the general purpose cow, but as yet without much success. I went through the herd very carefully, and after I had examined all their dairy cattle, I looked over the records; and, Professor, I think if you had seen the form of those cows, the differences in the conformation of the dairy Shorthorns, for instance, and the differences in the makeup of the Guernseys and the Ayrshires as compared with those Shorthorns, and had then examined their records, you would have seen at once that there was a great deal to the idea that there is a relation between form and perform. The cows that were profitable had a distinctly different form from those that were unprofitable dairy animals. And I was very glad to note one thing; that the Canadian cow, your native Canadian cow that you are trying to make a thoroughbred of,—and I think doing it very scientifically,—is to my mind

almost an ideal dairy cow. She has many of the qualities of the Ayrshire and Jersey combined. I have great faith in her as a coming dairy cow; but I want you to understand that she has the dairy form.

Pres. Bruce:—There is to be an evening session of the Woman's Auxiliary at 7:30.

I appoint a committee on resolutions, Ernest Hitchcock of Pittsford, G. W. Pierce of Brattleboro, and W. V. Beach of Charlotte.

MEETING OF THE WOMAN'S AUXILIARY.

Mrs. Bruce.—Ladies and Gentlemen:—

Eleven years ago tomorrow the Woman's Auxiliary of this Association was organized in the parlors of the Van Ness House. The ladies have been doing their work well, constantly increasing in membership, constantly adding interest to our meetings, constantly helping us throughout the year that we might have larger attendance at the next meeting, that we might improve all that was improvable about our homes, our creameries and our factories. And this evening is to be the Ladies' evening. I now have the pleasure of introducing to you the President of the Woman's Auxiliary, Mrs. Etta LePage, of Barre.

MRS. ETTA LEPAGE.

"Once more the annual convention of the Dairymen's Association calls us to this beautiful Queen City,—a city closely identified with the dairy and agricultural interests of our State. Here are located our State Agricultural College and the Experiment Station. Here the sessions of the dairy school were held for twelve years, until wholly inadequate accommodations compelled their suspension. It is expected that convenient quarters will be provided in the agricultural building to be erected here, and that the school will take a new lease of life. Dairying, the leading industry of our State, demands as thorough an education as any other business. The farmer is fast taking his proper place in the world, and his occupation is no longer looked upon as degrading. It is a fact that the modern world has been molded largely by men who learned their first lessons in life by a farmer's fireside. In all callings and professions, the great names are those of the country bred. Real success consists simply in making the most of one's self, and happy is he who, possessing a fraction of the earth, fulfills his mission as a farmer.

We have with us this evening, the Governor of our State, and he is a typical Vermont farmer. I take great pleasure in introducing to you Governor Bell."

(Applause.)

Governor Bell said:

Mrs. President, Ladies and Gentlemen:—It gives me pleasure to represent Vermont before the Woman's Auxiliary tonight and to address you. We convene here this evening in the Queen City of Vermont, I might say of New England, in one of the best dairy sections of the world, under the auspices of the Woman's Auxiliary to discuss matters pertaining to their interests in the work of the Dairymen's Association.

I well remember the first time that I attended a meeting of this Association. There was not a woman in the audience. The *Free Press* remarked the next day that one of the officers of the Dairymen's Association had brought his wife to the city with him. Things are changed in this respect, and this change has come about partly through the increased interest in and partly because of modifications in the conduct of dairying operations. The wife no longer skims the milk and makes the butter; this is done at the creamery or by machinery other than her hands; and so she has a little time to attend the Dairymen's meetings, to hear of better methods, to get acquainted with the neighbors, and to learn how butter is made up in Franklin County or down in Windham County or elsewhere.

Whatever Vermont does, she does well, in agriculture and in other kinds of work. We have the proud record of leading New England in the dairy business. We are somewhat clanish, as we ought to be, because we come pretty near being born in the Garden of Eden. Those who go out from us remember Vermont. They go into all parts of the world, and in the large cities form Vermont Associations. The longer they live away from Vermont, the more they love her, and hope in years to come, when their business life is over, to return to her, perhaps to the old homestead, to spend the remainder of their days in comfort and happiness.

While we are here tonight, considering these matters, let us think about the boys and girls. The men and women of today have tried to sustain the proud record of Vermont, and the boy and girl of today should feel the responsibility that will come to them as the years go by to maintain that record. The old district school, the little red school house on the hill, is of the past. What it is now is a little uncertain and its future is yet more doubtful. It is impossible even for the best of teachers to have a real interesting school with a few scholars. Now, is it not possible to centralize our schools in many of our towns, to have one grand school, good enough for boys and girls to be graduated from into college? They are at home during their leisure hours, under home influences, home training; that influence and training, that discipline, that self-denial that needs to come to all boys and girls to make them grow stronger

and better as they grow older. When they go away to boarding school, or to college, they are educated in a measure away from home, the best place on earth.

We sometimes think that when there is a wedding in the neighborhood, that there has not been an even exchange of valuation. It reminds me of a little verse I read the other day:

“They took worlds of pains in trying well to raise her.

She stands the fine fruition of their plans.

At a price unprecedented they appraised her,

But she's gone and given herself to that young man.

But never mind; his mother thinks he's priceless.

His father sat up nights to make him good.

She will have him for her own, fine, fresh and viceless.

Things sometimes really work out as they should.”

These are conditions that arise in many of the neighborhoods. The world is improving, and its people are not only growing more intelligent but better all the time, and better looking also.

At the Grange fair up in East Hardwick last fall, we offered a prize for the handsomest baby under one year of age, and another for the next handsomest; a prize for the largest and most numerous family under ten years old, and also for the same number, taking them by weight. One family won a big prize,—the father and mother not quite forty years old, and eleven children in the photograph, and you couldn't tell which was the oldest and which the youngest. There were twenty-five or more babies, and they were all handsome. Each mother, of course, thought hers was the handsomest. A little girl took the first prize and a little boy the second. But what I was going to say about the improvement of the race in Vermont was this; that when we came to look back over two generations, we found that the grandfathers of those two handsomest babies were two of the homeliest men in that section of the country. So I think it is safe to say that we are improving here in Vermont.

With the inspiration of the Woman's Auxiliary, with the united effort of the Vermont Dairymen's Association, we can instruct the world in making butter. We should remember that we dwell in goodly places, that we have a rich heritage, and that the only reason why we farmers are not above instead of on a level with the professional world is because we have been lowering our occupation, because we have said that farming didn't pay. Now, farming does pay. One can get more out of life on a farm if one don't get a dollar than in some places where a

thousand may be earned. Farmers are successful, as a rule, if they understand farming as an occupation and do their best.

There is a little town up in the north part of the State where the folks are always saying that farming doesn't pay,—and you know that about the first of April when the listers come around, it is a time when folks feel poor. The town is paying heavy taxes; it bonded years ago for a railroad. Everybody is attending to the dairy and to maple sugar making and is growing a few potatoes for a market; but you can't find a man in town that says he is making a dollar; and they are apparently honest men. Yet the chairman of the listers tells me that whereas ten years ago there was only ten thousand dollars in Savings banks, there is now seventy thousand dollars; and yet you cannot find a man that has made a dollar. These men are all farmers and dairymen; they are driving better horses, their wives get a new hat five or six times a year, their houses are better painted, they have better barns, their children are being educated; and yet farming didn't pay.

What is there of life better than health, happiness, pleasant family associations, lots of sunshine and of comfort upon a farm? Those who go to the great cities are glad to come back to Vermont to get a little recreation and better health, so as to go back again for another year. We have it all the year, my friends. Who would ask for a better place than Vermont has been for the past two months, even in what we call a Vermont winter,—beautiful weather, to drive in one's sleigh or buggy, just enough frost in the air to make you feel comfortable. Of course we have to learn to chop wood, but that is healthful exercise, the best thing in the world for a dyspeptic. It uses muscles which get used no other way. And then it is very healthful to milk the cows. I was in a farmer's barn the other day. He has a large dairy and he likes to milk cows. He milks fifteen or twenty or so; but he doesn't like to work harder than it is necessary. I noticed that he had a gasoline engine beside the door. All he has got to do is to pull a rope that sets the gasoline engine to work and it does the rest. If you use machinery aright, my friends, farming is nothing but play. You may get into trouble a little bit with the hired man, and it is sometimes difficult to get a hired maid, but if you have a gasoline engine, or a few of these things, you are all right.

Mrs. LePage:—Our farm homes should be the ideal homes of our land. We have with us this evening a lady who will tell us how to make them so. I take great pleasure in introducing Mrs. Addie Howie, a successful farmer of Wisconsin,

HOME MAKING.

MRS. ADDIE F. HOWIE, ELM GROVE, WIS.

Gentlemen and Ladies:—In coming to you many hundred miles across the country, I do not feel that I am entirely a stranger because twice before it has been my good fortune to visit Vermont; and then again were I to reach out my hand to Wisconsin, my fingers would be grasped by Vermonters. I again come to you and receive a cordial welcome from the same people, because the good people in Wisconsin that Governor Bell told you about nearly all came from Vermont.

(Applause.)

For many years we have had Farmers' Institutes and have with more or less profit discussed the most desirable methods of breeding and rearing livestock, the best ways to plant, cultivate and harvest various crops and numerous other subjects of interest and value to our line of work. But during all this time only an occasional talk meagrely bearing upon that most important topic of farm life has been heard. Now it seems to me that the farm is the ideal spot on which to build a home just as the broad spreading elm, oak or maple is the most fitting place for nesting birds. And while I might speak enthusiastically of the poetical and artistic side of farm life, I have no wish to dwell on these phases, because I sincerely believe that if we give careful thought and attention to the little practical things that have so weighty an influence on the happiness and comfort of our loved ones, the aesthetic features will soon follow on the same principle as "look after the pennies and the dollars will take care of themselves."

NOT ENOUGH SENTIMENT.

It is an undeniable fact that the most of us put too much labor and not enough sentiment into our lives. We look upon endearing words and gentle, thoughtful courtesies used in the family circle as superfluous to every-day life and practice, when,

if rightly applied, they prove a healing balm for tired bodies as well as bruised hearts. We count our cattle and reckon their money value before we consider their keeping and development as a sacred trust. We measure our grand old forest trees by the cord and coolly estimate the gain by their ruthless destruction rather than bend our heads in awe before the mysteries of Nature's greatness. Familiarity has bred contempt and one of the finest attributes of human nature, that of appreciation, has been starved and dwarfed by a surfeit of blessings.

In passing through the country one may see from the car window many a weather-beaten farm house with not a tree, a vine or shrub to mark it as the home of refined, interesting people. The dooryard will be untidy and littered with unsightly objects; the outbuildings filthy and the cattle scrawny and wild-eyed; farm implements carelessly left unprotected from sun and rain in field or yard. Can one wonder that such a picture does not prove alluring, and that such a dwelling passes for no more than a shelter, even to a farm-born generation whose tendency to discontent is frequently encouraged, rather than uprooted, by the methods and teachings of slovenly, short-sighted parents.

HOW TO KEEP THE BOYS ON THE FARM.

A pathetic wail has gone forth throughout the length and breadth of the land, "What can we do to keep the boys on the farm?" Before attempting to answer, may I ask what we have ever done to make farm life congenial and attractive to our young people? Have they ever heard aught from us of a laudatory nature concerning our calling? Have not we farmers placed a stigma on our own occupation by holding up the defects instead of the praiseworthy qualities, by impressing upon the young minds the idea that farm life and labor were degrading; that there was neither profit nor satisfaction in the business and that in the nearby or distant city could be found more respectable and attractive modes of earning a competence? Yes, we have woefully belittled our own calling in an attempt to magnify the greatness of others. In a maudlin self abnegation, we have said to our children, "Our lives have necessarily been one of self-denial and drudgery. We will still work our fingers to the bone that you who are too good for this labor may have the advantages of a broader education. John shall be a lawyer, a doctor or merchant and, with good clothes and polished manners, occupy a higher position in the esteem of his fellow men."

In planning for an ennobling mental and physical development, why not educate John in the same line of business his father has followed? Let him go forth and study the improved

methods of agriculture that with his practical training and newly acquired knowledge he may help the old farm to keep pace with modern science and skill. Teach him that there is no more dignified, honorable or wholesome way of earning a livelihood than by forming a partnership with the forces of Nature. Do not hold up before his young eyes the almighty dollar as a scale by which to measure the length and breadth of success. Impress upon his youthful mind that the results of conscientious thought and toil will daily gain in force and influence while the minted coin diminishes in value by constant circulation.

Mary shall be given accomplishments. She shall be taught music, painting, art needle work in order to make her so attractive that she may marry well. What is the meaning of marrying well? Is it to give our daughter to the dissipated son of some rich man who is eagerly waiting for his father's death that he may spend in riotous living, the money accumulated in a lifetime of labor; that by neglect and indifference he may break her heart and ruin her life? Is it for this that we toil and save and scheme? Oh, let us who have the advantage of farm life, living so close to Nature that we may feel the great Creator's presence in every bush and shrub,—let us raise our ideals for while we may safely send our little ones away to acquire the book knowledge, let us form their characters, their aims and ambitions right in the home circle.

THE DIGNITY OF LABOR.

Let us teach our children by both precept and example the true dignity of labor. Let us teach them that no honest work is degrading, that the only disgrace is the manner in which it is performed. Let us teach them to love and revere the farm and farm life, that their hearts should ever be filled with gratitude to God that He has given them broad acres rather than a tiny patch of ground; that He has entrusted His lowly creatures to their care and that they may with earnest solicitude study so well the requirements of this great trust that they need fear no accounting.

A WRONG STANDARD SET UP.

Either by design or unconsciously, we have held up a wrong standard for our loved ones to follow. We have taught them to regard money and position above character and worth. We weak, foolish and ambitious mothers in our desire to uplift our daughters in the esteem of a frivolous society, have stamped upon their childish, impressionable minds the belief that the practical

duties of homemaking, the things that represent so much in the welfare and comfort of our dear ones are beneath the best efforts of an intelligent and self-respecting woman.

WOMAN'S DIVINE MISSION.

Why, it is the heaven born mission of woman to be a home-maker. From the time as a wee toddling girlie she hugs her dollies and plays at housekeeping with bits of broken china, the home-making trait is strong within her and if we succeed in diverting her natural instinct we will have blotted out the sweetest, most lovable and noblest characteristic God has given to woman. Let us teach her that if she possesses the dignity of self-respect, others will respect her. Let us hold up the high ideals of thoroughness, system and order in the curriculum of exalted home-making. Let us teach her that there is art and science in cookery, dish-washing and scrubbing. Don't say "Mary, I'll wash the dishes, it will make your hands coarse and red. You go and practice, I'll attend to the kitchen." Teach her the neatest and most thorough way to do the work. Why, do you know, there is not one woman in fifty who knows how to properly wash dishes.

Let her feel that you depend upon her assistance. Let her see that you take pride and pleasure in your kitchen and the utensils best suited to the convenience of doing superior work. An ample sized and well made dishpan is more to be desired in the kitchen than a plush album in the parlor. Don't say "Mary, go and dress up. Someone may come in and it won't do to let them find you in your working clothes." Teach her to look tidy at all times; that she is as much a lady in print as in silk; to meet company without embarrassment, even though she holds a scrubbing brush in her hand and her sleeves are rolled to the shoulder. Teach her it is far better to darn a stocking neatly than to injure her eyesight making fancy work. In short, teach her so thoroughly and well the practical accomplishments that rightfully belong to the higher education of a capable housewife that she will prove a blessing and a helpmate to the fortunate man, be he rich or poor, whose name she may some day bear. In this way we may build a substantial foundation for her future happiness.

A GOOD FOUNDATION NEEDFUL.

Supposing a builder were to erect a most beautiful palace by beginning at the cupola, adding ornamental bay windows, with elaborate filagree work here and there, and then place the

structure on posts, no foundation to this magnificence. The result is quite apparent; he would receive and deserve the most scathing criticism of those who passed by. Undoubtedly they would remark: "Look at all that filagree nonsense and no foundation. Surely the builder had more ambition than sense." Let us build first a solid foundation for her future usefulness as a homemaker and then add the less essential features of music and art to her education. What is education? Is it a little book learning too often acquired at the expense of hand and heart? The best and truest education is the knowledge gained where heart and hand and brain have been developed in unison and such wisdom used for the benefit of all mankind. We are riding our educational hobby too fast and the unmistakable wood is exposed every time the lash of progression clips from its flank the gaudily painted dapples.

THE ACCOMPLISHMENTS OF OUR GRANDMOTHERS.

Let us turn back the hand of time and more carefully regulate the pendulum. Yes, even to the days of our great grandmothers, if need be,—to an age when women baked and brewed, spun and wove, cooked and sewed and did not lose caste by doing cheerfully and faithfully the manifold duties that by right of dower fell to the mistress of a home and family.

NEED OF RAISING HOMEMAKERS.

Yes, let us raise a few generations of homemakers, rather than the strong minded, ambitious, self supporting girls who, in the hand to hand struggle of bread winning become heart hardened and aggressive. "Look out for number one" is the precept laid down for them to follow, and by so doing they grow selfish and skeptical. "Look out for the welfare and comfort of those about you and take no thought as to the fate of number one," is the counsel that will come from the gentle heart and lips of a wise mother. Why, it is like looking into a mirror,—what you give to others will quickly reflect. No, she need not look out for number one, let her best efforts be used for the betterment of her dear ones, and I promise you number one will in no wise suffer.

A quarter of a century ago it was not unusual to see brides of sixteen and seventeen years. And while today we have just as sweet, just as lovable and attractive girls, you may find many at twenty-eight and thirty who have never received a proposal. Why is it? Well, in spoiling our daughters, we have also harmed our sons. We have taught them to admire the stylishly

dressed girl; the girl with a few superficial accomplishments, who oftentimes in a longing for luxuries beyond her means grows restless and discontented. The average young man who must make his way, his own way in the world, quickly arrives at the conclusion that without an abundance of money or high social position, it would be utter folly to attempt to make such a girl satisfied and happy. Therefore he assumes an indifferent air; talks lightly of matrimony; has it understood that he is not a marrying man, although fond of women's society. The money that he might have put by for the purpose of building a modest home is used selfishly and extravagantly in an attempt to keep up an appearance of social standing. He cultivates an egotistical belief that all the young women of his acquaintance must regret his determination to be a life-long bachelor. One evening he will favor Mary with his company. He will explain that Mary is a delightful companion. She can play rag time music and sing coon songs too cute for anything. The next evening he will devote his time to Kate. She is such a delightfully sweet and dignified girl, plays the mandolin and talks entertainingly of pre-historic art. Yes, she is perfectly charming. But, after sober reflection, he doesn't care to risk injuring his digestion by eating the cooking of either of these girls.

HOW TO GET A HUSBAND.

Now, girls, I'm going to tell you in strict confidence how to get a good, sensible husband, and then, if he prove worth the effort, how to keep him constant and content throughout all time, for the saddest thing in the world is, when a woman has once won the love and respect of a good man, to have it slip away from her through either her own carelessness or ignorance.

First of all, lay well the foundations of a perfect homemaker by learning to be a good cook, a systematic and tidy housekeeper, an excellent needle woman who understands the art of darning and mending, for "A dollar saved is a dollar earned," and by painstaking care in this direction, you may almost double a man's income. When you feel yourself so thoroughly proficient in these accomplishments that you may unhesitatingly take your place beside the man you love as his helpmate, to encourage and assist him on the road to greatness and prosperity, you stand ready to fill the sacred mission for which you were intended.

Now, did you ever see a man catch a colt? He puts some oats in a little pan and goes to the field, where he stands quietly and shakes the pan until the colt hears the rattle of the oats and comes prancing up. But the man never runs after the colt and don't you ever run after a man. When the colt becomes in-

terested in the oats the man slips the halter over its head and leads it away. But sometimes, even after the halter is safely fastened, the colt will rear and plunge and if the man does not hold firmly to the strap, it will break away and the task of bringing him back will be more difficult than before.

Now, put these housewifery attractions in a pan, as it were, and while standing in your father's doorway shake the pan—the safest place a young girl ever stood is under the shelter of her father's roof. The young man will hear the tinkle, for the novel sound will echo far and wide. Such rumors as: "Mary Jones is a remarkable girl, such agreeable manners, such a model house-keeper; a wonderful help to her mother; why, her parents couldn't do without her," will go floating through the air, and men are queer creatures, whenever they hear that someone has something that they cannot spare they're bound to possess it. And in all probability more than one young man will have a longing to claim for his wife so capable a companion as Mary Jones.

Now, should a young man come whose love you cannot return, remember that in tendering you his heart and name he has offered you the greatest honor a good man can confer upon a woman. If you do not love him, do not lower yourself in his or another's estimation by refusing him and then going about saying: "I could have married John Smith, but I didn't want him." Let your lips be sealed, regard his confidence as sacred, for if you do not love him you can at least respect him, and never for a moment let him feel that he has made a mistake in thinking you worthy of honorable love. But when the right one comes; the one you can gladly say you will "love, honor and obey" there will be no fear of poverty. If you are a true type of American womanhood, you will staunchly and proudly take your place by his side, feeling it a privilege to be in every sense the helpmate that may nobly win the right to receive a royal share of credit for his ultimate success.

THE IDEAL HOME.

Some may think that in order to have an attractive home it will require a large outlay for a suitable building and the necessary furnishings. Don't make a mistake. The most beautiful home I was ever in was a little log house of but one room and a shed. It was so exquisitely clean, and, after all, true elegance is thorough cleanliness. Fifty dollars would have paid for every bit of furniture it contained, including the bed and cookstove, and yet, it was amply furnished; the most artistically fitted up home I have ever seen. Every article was for use and was held dear from association. The floor was scrubbed so white that no

one would have ventured to step within until he had first wiped his feet on the husk mat that Margaret had woven with her own hands. There was a braided rug upon the floor, and an old-fashioned rocker with a feather cushion. On the little log window sill was a pot of plants that Margaret had brought from her eastern home, and the snowy muslin curtains were bits of her wedding dress. There was a cheery picture on the wall and a mending basket that gave an added charm to the room.

I don't believe John ever put on a pair of socks that had not been darned with all the painstaking care given to the finest embroidery. There was a little pine table, so fair and spotless that I used to wonder if it would melt away into fairyland should I put my childish finger on it. And above the table were some little shelves—put there by John, to hold the few dishes they owned. Do you think Margaret carelessly dumped those dishes in a pan and hastily banged them about regardless of nick or crack? No, she handled them with tender care. She was John's faithful, loving wife and well knew they could not afford to waste money replacing things broken by carelessness. Nor did she wish to see their table, however plain, made poorer or unsightly by chipped and blemished ware.

And there was dainty, refined Margaret and sturdy John, who had in no wise ceased to be a lover while bearing the title of husband. Yes, it was the most beautiful home I have ever seen, for it contained the necessary elements to make it such. There was cleanliness, system and order. There was unselfishness, contentment and love. What more do you want? With these elements you could make an acceptable home out of a dry goods box. I have since been in a number of beautiful dwellings, where there was marble and tiling, elaborately carved wood and artistic frescoing, antique rugs and luxurious furnishings, rich draperies and magnificent paintings, rare bric-a-brac and exquisite statuary, but I have never been in a home that left so marked an impression upon my heart and brain as did that little pioneer hut on the border of an Iowa prairie.

FURNISHING A FARM HOUSE.

In furnishing a home we farm women too often seek to imitate a style quite unsuited to our conditions and surroundings. For instance, the large, heavy carpets, that in the city would be sent away to be cleaned, would prove a formidable tax on woman's strength; and it would indeed be a brave housewife whose courage would admit of asking assistance from the men during the stress of spring work. Hardwood and painted floors with rugs of a size easily handled are more in keeping with farm

conditions. Deeply tufted, upholstered sofas and chairs will require a vast amount of time and patience to keep in a pleasing state of freshness, while easy chairs with movable cushions are more inviting and require far less attention. Good books and pictures will be the first consideration in a cultured home and the occasional purchase of a thoughtfully selected volume is a wise and profitable investment. A well-ventilated sleeping room, provided with the customary toilet necessities, with a single iron bedstead and roomy washstand is more desirable than a stuffy apartment containing a massive set and a shortage of towels and toilet soap. If comfort and convenience be considered paramount to magnificence, we will make fewer mistakes in selecting our furnishings.

ADVICE TO THE WOMEN.

When one possesses a husband and home, she should bear in mind that it matters not how warm and glowing a fire one may have kindled, that, if it would be kept burning, fuel must be added from time to time. And so it is with the fires of love. If treated with indifference and neglect they will soon smoulder to ashes of regret.

Therefore, if you are a wise woman, you will from the start plan a practical course by recognizing the fact that no man is an angel, consequently do not expect too much. And if you would make his home more attractive than any other place look well to his physical comfort. See that his meals are carefully prepared and served on time. You know you deceived him when you made him think you the dearest, sweetest girl on earth. Now, keep up the delusion. Never let him suspect that you are not. I have seen just an ordinary little woman, who didn't know much—you don't have to know much; men, as a rule, are content to know it all—fool her husband for thirty years and even longer and he'd never find out that she wasn't the sweetest, smartest and most lovable woman in the world.

I have actually known a woman of this kind to give her husband so good an impression of the sex that if he lost one wife he wouldn't hesitate to marry again. You can do this if you only try, why, you can wind a man around your little finger and he'll never be the wiser. Men are dependent creatures. Did you ever see one with a missing button or something gone wrong with his suspenders? He'll go calling through the house, "Mother, Mary, come quick, I've lost a button!" Now's the opportunity to show him you're the most wonderful woman on earth, for whenever a man sees another do something he can't do, he thinks it marvelous. Put on your thimble and sew that

button good and firm, while you casually remark that you don't know how he ever managed to get along without you. And he'll wonder that he ever did. Oh, you can fool them in a hundred loving little ways. Men like petting and many of them have been used to it, for, if there is anything dearer to a mother's heart than her girls, it's her boys.

If you are a wise woman you'll never let him miss his mother's sympathetic encouragement and approval. Remember that what is for his interest is for yours and that he can work better and harder when he hears your cheery words of approbation ringing in his ears and knows he will be welcomed by your happy smile.

Make yourself a necessity to him and take advantage of his every weakness. Men are conspicuously vain. Why, a woman's vanity is nothing compared to that of a man. Praise his every commendable effort. It will spur him on to greater achievements. Go out to the barn and show an interest in the cattle. Commend his manner of feeding pigs. Jolly him up a bit by drawing flattering comparisons between his and his neighbor's methods. Yes, take a loving interest in everything on the farm. The barns will be sweeter and cleaner by your presence; the cows will be more tenderly cared for and you will be so rich in joy that a more sordid ambition will be forgotten.

But there are three things you must not do if you would keep your husband's love and respect. You must not complain, you must not find fault and you must not nag him. If you have a trifling headache never say, just as he is starting to his work, "John, I don't feel well." It will put a damper on his best efforts. Women were born to make believe and you can smile, even if you're not feeling quite right, until he has left the house. Then, if it's any benefit to yourself, do yourself up in camphor and groan to your heart's content. If you are really ill, go to bed and call a doctor and you'll then know the sweetness of a tender sympathy. John will exclaim: "Bless me, the dear little woman must be sick for she never complains," and he'll undoubtedly do all in his power to restore you to health.

And don't find fault when he's making every effort to succeed. Don't paralyze his ambition by saying: "John, I was over at neighbor Smith's and they've got a new carpet and a rocking chair and a picture and are going to have their parlor newly papered, and—I don't see why we can't have such things. We're just as good and I work just as hard as Mrs. Smith. There must be something wrong with your management. I don't think you're very ambitious." O, if you value your happiness, don't do it. Can't you see you are pushing him away from you? Never for a moment let your husband see you have lost faith

in his ability. Though he fail in many schemes, encourage him to try again. Though all the world loses confidence in him, if he is an honorable man, never let him know that you are disappointed or that your trust has wavered.

I'll tell you what to do. Put your arm around his neck and say cheerily: "John dear, do you know what those foolish Smiths have done? They've bought a carpet and a patent rocker and a lot of truck and now they'll have it to care for. I'm so thankful we've more sense. When we get enough money to pay for such trash we'll use it to buy a cow." You may punctuate this with kisses if you like and John will think was there ever on earth such another sensible little body. O, you can fool them to the end, if you only understand your business.

And above all, don't nag. A constant nagging would break the spirit of any man. You may have a temper (some women acquire one by inheritance), but you never allowed him to see the ugly side of it before you were married, and don't do it now. If you feel you must give vent to it, wait until he has gone, then grit your teeth, take a good, solid chair and shake it furiously. You can make believe it's John and no harm will come to the delusion your husband is laboring under. John, all unconscious, will very likely be heard bragging about the even disposition of his wife. Still, if you are unable to control your temper, if you must give John a piece of your mind, have it out, in a hand to hand conflict, if need be. It may clear the atmosphere, like a thunder storm. Still, I wouldn't advise it, but it's better than nagging. Whatever you do, don't nag.

COMPANY AT THE FARM.

The usual monotonous round of indoor work is broken all to smithereens by the occasional appearance of one of more guests, for while some townbred people shrink from the responsibilities incident to rural life, they are not unmindful of its summertime attractions. And when spring buds and bloom are beckoning in tantalizing fascination the temptation to make a raid on some nearby farm house becomes so irresistible that a cheery voice will be heard calling to a neighbor: "It's a lovely day. Don't you want to take a drive in the country. I know a farmer who lives a few miles out. They're farmers, but they're nice people," is hastily added by way of apology for so obscure an acquaintance. "They own a big farm and have lots of cows, sheep and chickens. Don't you want to go? Pshaw, they won't mind if you are a stranger, they'll be tickled to death to see us. Bring the children and we'll have a fine time." Did you ever, right in the midst of house cleaning, when you were struggling to gain time by hav-

ing a picked up dinner, look out and see a load of jolly, daintily dressed city people drive up to your door? Did you? And did you wring your hands in despair as the meagreness of the family larder flashed through your startled brain? No pie, no cake, no seasonable delicacy on hand, and then go forth hospitably to meet them and say, "I'm glad to see you," and at the same time feeling yourself the old hypocrite that you so heartily despise?

Now, I beg of you, don't put those people in a stuffy parlor and offer them amusement in the shape of a family album. They don't care a rap for the pictured faces of "your sisters, your cousins or your aunts." They may take a passing interest in the veil-decked bride or the chubby charms of an unknown infant, but it won't add to their good opinion of the restful side of farm life to have you rush to the kitchen and begin baking and stewing until your strength is exhausted and your nerves all aquiver. Don't let them carry back to their city homes the impression that you are an ignorant drudge whose sole conception of hospitality is an overloaded table and an apologizing hostess.

There are refined, thoughtful people, who live in cities, who do not come to you for a meal. They can buy that. But they do come longingly to the farm for what is priceless. They come for the peace and rest and comfort that country life affords. They come to fill their weakened lungs with that rare oxygen of which we have so much and to spare. They come to be in closer touch with Mother Nature and to lay their weary heads upon her soothing bosom; to learn something of her wondrous secrets, and for a time to break loose from the galling chains of formality.

Now don't give them the idea that farm life dwarfs the intellect. Greet them with a cordial welcome. Let them see that while you may know nought of the latest social fads, you are quite familiar with every phase of your calling. Give them a part of yourself and a share of your wisdom. Take them to your clean barns, show them your gentle cattle and call their attention to the individual merits of your stock. You may be able to quite astonish them with the glibness by which you can tabulate the pedigree of a favorite cow. Have a dignity and pride that will serve to point to the uplifting character and attractive features of your profession rather than assume a bearing that will tend to accent its defects.

If you are the good housewife you should be, your bread and butter will be wholesome and palatable. If you have tea and coffee, well and good, if not, perhaps you have milk, in case of a shortage in this liquid, there is water. Your table should at all times be clean and it will require but a moment to lay the extra plates. Now, ring the bell or blow the dinner horn; call in the

men. It will not be necessary to offer an explanation for having your help eat at the same table; your guests will readily understand that it is your usual custom, and one best suited to your conditions. Have a dignity and manner of your own and it will be respected. Do not strive to imitate ways unsuited to your means or mode of life.

“HONOR THY FATHER AND THY MOTHER.”

Yet, I have known of cases where fathers and mothers had toiled and saved and planned all the best years of their lives in order to give their children advantages of which they themselves had been denied. They had sent them to academy or college to obtain the education that should prove a potent passport to the esteem of all men, and these young people had returned vain-glorious enough to feel the knowledge acquired had raised them superior to those who through long years of self-denial had made this educational training possible.

I have known these young men and women when entertaining some college friend to say: “Let’s get father to wait.” Perhaps father likes to eat in his shirt sleeves, or with his knife. Well, what of that? Isn’t it father’s home? And such breaches of etiquette are mere trifles compared to the sneaking ingratitude of a nature that would postpone father’s meal in order to cater to the good will of a stranger.

Now is the time to show father the true value of a creditable education. Let him see that the money obtained by many sacrifices on his part was not misapplied; that it had helped to make a man of you and not a contemptible snob. Place him at the head of the table with the unmistakable air, you are honored today by being permitted to eat with my father.

The man or woman, young or old, who is too good to sit at father’s table and eat father’s bread in father’s company is not the person for you to cultivate. Cut the acquaintance at once and let your aim in life be to move in a better grade of society. It may be your father’s clothes are not the latest cut; possibly they are sunbleached and shiny at the seams. Still, if you will stop to think, he may have been so occupied in his efforts to pay the bills for your improvement that there was little time for thought of his own apparel. Remember this and that your filial obligation is a lasting debt of gratitude. See that it is paid in full and with usury, for if his son does not show him deference you cannot expect others to do so,

NEED OF LITERATURE.

The progressive farmer of today needs no urging to supply his family with abundant and suitable reading matter, therefore, the country woman may be as well informed on both foreign and domestic subjects as one who resides in a city, and with the helpful influence of natural surroundings there is no reason why the home on the farm may not become a veritable paradise.

TO THE MEN.

While the task of home-making is more generally supposed to devolve on the woman of a family, each member, great or small, should bear a responsibility and take both interest and action in preserving the dignity of home life, be it lowly or grand. Some men are utterly unconscious of the fact that they have formed an entirely erroneous idea of woman and her claims upon them. They are unable to comprehend the real nature and characteristics of the true type of an intelligent, refined woman. They do not know how to draw out and develop her finest qualities any better than some farmers understand managing a dairy cow to obtain best results.

They are laboring under the impression that all women are vain, frivolous, irresponsible creatures that should be firmly held in subjection, that if a man is unable to provide one with fine clothes, jewelry and social amusement she will soon become discontented and wretched. A greater mistake was never made. The real woman doesn't care for fine clothes, jewelry or social position. If she favors them, it is only because she believes such adornment and position will make her more pleasing in the eyes of the man she loves. Women were born to make believe, and I have known them to serenely smile while their hearts were breaking. No, she does not hinge her happiness on luxurious raiment. If she cannot command something better, she'll take it, just as a starving cow will eat straw when she can't get hay, but she'll not thrive and develop all the tender possibilities that lie within the fertile soil of a glorious nature.

What she does desire above all things is appreciation, love and petting. It doesn't cost anything. She'll never tell you, for the woman I have in mind is too proud to beg for what rightfully belongs to her. When you have taken this girl to share your fortune of either weal or woe, when you, by your protestations of love and fidelity, have severed the ties that bound her to the home of her girlhood, when she has willingly forsaken father and mother to cling only unto you, make it your life long study

and duty to see that she never has cause to regret the step that you are responsible for her having taken.

Be patient. Remember that heretofore she has leaned upon the counsel and encouragement of her mother, and now she is called upon to exercise her own judgment and skill. She'll make mistakes, she wouldn't be human if she didn't. Commend her every effort, even if the result fall short. Let her see that you have faith in her ability to accomplish all things, and she'll not disappoint you. Tell her she is the neatest, most orderly, little housekeeper in the country, and you are proud to have the neighbors go through her kitchen. She'll not fail you. Tell her if she keeps on improving she will beat your mother cooking. Why, man alive, she'll do it every time. You don't know of the qualities to be brought out and emphasized with a little judicious praise. Save her strength, because an ambitious little woman will place no limit on her endurance when she's bidding for the approval of the man she loves. Keep a watchful eye on her that she may not overtax her energy, and, if you cannot afford help, there are numerous ways in which you may render valuable assistance about the house.

See to it that she has an income or allowance that is quite her own, and for which she need render no accounting. Let her feel that you would gladly provide her with every luxury if it were within your power. Give her the chickens—you'll have a better flock of fowls—and see that she has the proper place and the needed assistance to enable her to show her skill and business ability in their management. Say to her: "The money you get from this source shall be yours without question." You'll find it will pay you well, for when taxes are due or you want to cancel a note, you won't have to go to the bank, you can borrow of your wife,—she'll have it saved.

No, women are not the extravagant creatures some men think them. Give her your confidence and let her feel the blessing of your unbounded trust. Say to her: "Here is the pocket-book. There are such and such payments to meet, you know what we can afford as well as I; use the money as you think best." This liberty and confidence will be its safest guard, she will never touch it without first consulting you. You'll find it all there and she will cheerfully make over her old dresses and trim her bonnets, year after year, until you begin to admire the more up-to-date clothes of some other woman.

Don't say my farm. This is a partnership affair and the proper term is our farm. Ask her advice on all business matters. If you don't see it to follow her suggestions explain your objections and she'll be satisfied. Let her be thoroughly conversant with your business and business methods, then, if you

should leave her unprotected, she will be less liable to fall a victim in the toils of unscrupulous estate adjusters.

Don't go about with your lips shut and your mind occupied on matters too weighty for her comprehension. If she timidly calls your attention to the merits of some new dish or improvement, don't carelessly say: "O, it's all right, if it wasn't you'd hear from me." Such comments will crush the spirit and ambition in any woman.

Don't take it for granted that she knows you love her, tell her so. I'll give you a ration. Tell her three times a day that you love her—no roughage in this if you please. Don't tell her in an indifferent way. You know how you said it the first time, now repeat it with renewed tenderness. Three times a day is not too often and many women can assimilate to advantage a much heavier ration. Don't be afraid to use endearing terms; have a pet name for her and call her girl, even if she be sixty or older. Youth and age are the times when love is best appreciated.

Don't complain that women fade and that the stylish, lively girl is too often apt to change into a morose, commonplace matron, for it lies within your power to prevent this transformation. A woman's heart is a strange creation, it is a sensitive plant that sends out tiny clinging tendrils and if they come in contact with a cold, unresponsive barrier, they will turn and seek sustenance elsewhere.

Sometimes she will transfer to her children the love and devotion that would have been gladly given to her husband had she met encouragement. Again the better part of her affectionate nature is bestowed upon clubs, charity work, educational aims or ambitious schemes. Sometimes Satan, in the guise of one who understands her nature, offers a glittering imitation of the more substantial love she craves, and if she has been taught to regard indolence and luxury above honor and industry, her situation is indeed a perilous one, but, if from childhood she has been trained in a belief that humble duty conscientiously performed may bring greater reward and joy than a realized ambition, she stands serene and safe.

So long as she has assurance of her husband's love and confidence she will never grow old or discontented. Tall sons and daughters, yes, and tiny grandchildren may mark the progress of years, but she, living in an atmosphere of love and sympathy and confidence will never grow old. I thank you for your patience and for your attention. I have felt your sympathy through the whole evening. Again I thank you.

REPORT OF THE SPECIAL MEETING OF THE WOMAN'S AUXILIARY.

The Special Meeting of the Woman's Auxiliary of the Vermont Dairymen's Association was held Wednesday afternoon, January 10th, in the parlors of the Van Ness House, with a large attendance.

The meeting was called to order by the president, Mrs. Etta Le Page of Barre. After singing "Nearer My God to Thee," the Lord's prayer was recited. The report of the secretary was next read and accepted, and the president delivered the annual address.

A paper on "The Art of Slighting" was presented by Mrs. Mary C. Higbee of Charlotte, after which Mrs. F. B. Smith of the same town sang a solo. Mrs. Addie B. Howie, of Elm Grove, Wis., gave a very practical and entertaining talk on poultry raising. After another solo by Mrs. Smith, the annual election of officers took place.

The old officers were re-elected and are as follows: President, Mrs. Etta Le Page of Barre; vice president, Mrs. H. C. Aseltine of Fairfax; secretary and treasurer, Mrs. Edna S. Beach of Charlotte. Four new members were admitted. A rising vote of thanks was extended to Mrs. Howie for the interesting talk which she gave at the meeting.

The names of the new members are as follows:

Mrs. Addie B. Howie, Elm Grove, Wis.

Mrs. Emma Fox Candon, Pittsford, Vt.

Mrs. Jennie Macomber, Shelburne, Vt.

Mrs. A. D. Cochrane, Jericho, Vt.

EDNA S. BEACH, Sec.,
Charlotte, Vt.

LIST OF MEMBERS OF WOMAN'S AUXILIARY.

Mrs. Margaret M. Reed	Burlington
Mrs. Mary H. Pitkin	Marshfield
Mrs. Carrie A. Nelson Shackford	Ryegate
Mrs. Annie Dodge	Morrisville

Mrs. Mary A. Smith	Morrisville
Mrs. D. D. Howe	Burlington
Mrs. Mary R. Ralph	Brookfield
Mrs. A. L. Walker	South Woodstock
Mrs. Elinor T. Clark	Brookfield
Mrs. E. P. Carpenter	Waterford
Mrs. S. J. Hastings	Passumpsic
Mrs. F. S. Collins	Burlington
Mrs. George Crane	Wilmington
Mrs. C. J. Bell	Hardwick
Mrs. L. R. Jones	Burlington
Mrs. C. M. Winslow	Brandon
Mrs. J. O. Sanford	Stamford
Mrs. Mary Kibbe	Brookfield
Mrs. Louis W. Clark	Brookfield
Mrs. A. B. Manchester	Randolph
Mrs. T. F. Betterley	West Brattleboro
Mrs. C. H. James	Cornwall
Mrs. Alvira A. C. Ware	Brattleboro
Mrs. Sarah J. R. Whitman	Brattleboro
Mrs. C. D. Hazen	Wilder
Mrs. Jennie Bronson	East Hardwick
Mrs. Ida M. Pierce	Brattleboro
Mrs. Jennie L. Brock	Barnet
Mrs. F. L. Smith	Fletcher
Mrs. M. W. Clark	Williston
Mrs. John Smith	Newbury
Mrs. Jennie S. Bentley	St. Albans
Mrs. M. A. Curtis	Georgia
Mrs. M. B. Fuller	Georgia
Mrs. C. E. Martin	Rochester
Mrs. E. W. Smith	East Berkshire
Mrs. E. R. Towne	Waterbury
Mrs. R. B. Galusha	South Royalton
Mrs. H. M. Crane	St. Albans
Mrs. O. T. Sunderland	Georgia
Mrs. M. L. Aseltine	North Fairfax
Miss Elma Eldred	Sheldon
Mrs. E. M. Denney	Montpelier
Mrs. Fanny A. Drew	St. Johnsbury
Mrs. C. H. Higgins	St. Johnsbury
Mrs. Alma F. Waters	St. Johnsbury
Mrs. Mary A. Brackett	St. Johnsbury
Mrs. Bessie H. Strong	Thompson, Conn.
Mrs. S. A. Vail	North Pomfret

Mrs. I. C. Houghton	Lyndon
Mrs. L. F. Bickford	Bradford
Mrs. L. H. Davis	Barre
Mrs. J. E. Bass	Randolph
Mrs. Edward C. Smith	St. Albans
Mrs. Jennie S. Wood	Winchester, N. H.
Mrs. Sophia B. Craddock	Brattleboro
Mrs. Ella A. Eames	Brattleboro
Mrs. Almira L. C. Robbins	Brattleboro
Mrs. Susan F. Lowe	Brattleboro
Mrs. H. D. Thayer	Brattleboro
Mrs. M. I. Reed	Vernon
Mrs. W. C. Cushing	Vernon
Mrs. A. A. Mason	Townshend
Mrs. E. B. Batchelder	Townshend
Mrs. Callie S. Talcott	Williston
Mrs. T. H. Lyster	St. Johnsbury
Mrs. M. B. Leach	Essex
Mrs. W. S. Hastings	St. Johnsbury
Mrs. J. A. Leary	Jericho
Mrs. P. B. B. Northrop	Sheldon
Mrs. W. H. Whitcomb	Jericho
Mrs. Isadora A. Candon	Pittsford
Mrs. Mary H. McCormick	Rutland
Mrs. Etta W. LePage	Barre
Mrs. Winnifred Sprague	East Brookfield
Mrs. Ida H. Read	Shelburne
Mrs. G. E. Davidson	Newfane
Mrs. A. Elizabeth Sherburne	North Pomfret
Mrs. F. M. Bigelow	Essex
Mrs. Elizabeth B. Lund	Burlington
Mrs. Sarah J. Rice	Burlington
Mrs. Edna S. Beach	Charlotte
Miss A. M. Bell	East Hardwick
Mrs. Della J. Gile	Morristown
Mrs. Annette M. Sherwin	Hyde Park
Mrs. T. E. Donahue	Hinesburg
Mrs. D. G. Donahue	East Charlotte
Mrs. Lottie A. Terrill	Morrisville
Mrs. Sarah D. Coburn	East Montpelier
Mrs. Phoebe C. Adams	Stowe
Mrs. S. C. Pike	Marshfield
Mrs. J. A. Nesser	South Burlington
Mrs. Alice W. Colby	West Berlin
Mrs. J. A. Kelton	East Montpelier
Mrs. George Cochran	Ryegate

Mrs. E. C. Hillis	North Montpelier
Miss Mabel F. Coburn	East Montpelier
Mrs. J. A. Coburn	East Montpelier
Mrs. H. H. Templeton	East Montpelier
Mrs. Rogene E. Herrick	West Milton
Mrs. L. A. Gilman	Randolph Center
Mrs. F. W. Ayers	Essex
Mrs. C. W. Guernsey	Montpelier
Mrs. F. T. Hutchinson	Worcester
Mrs. A. C. Hall	Putnamville
Mrs. J. C. Peck	Morrisville
Mrs. Oliver Drew	South Burlington
Mrs. Alice M. Carpenter	Cambridge
Mrs. F. L. Russell	Shrewsbury
Mrs. C. J. Pameter	Montpelier
Mrs. H. Brown	East Montpelier
Mrs. Leonora H. Mimms	41 High St., St. Albans
Mrs. C. C. Gates	N. Hartland
Mrs. Cyrus A. Bump	W. Salisbury
Mrs. W. S. Haynes	Middletown Springs
Mrs. A. J. Haynes	12 E. Washington St., Rutland
Miss Nellie Barney	72 Liberty Ave., Rutland
Mrs. L. R. Burr	N. Clarendon
Mrs. Edward Nichols	Bridport
Mrs. D. K. Hall	Rutland
Mrs. W. O. Baird	Pittsford
Mrs. H. L. Winslow	N. Clarendon
Mrs. R. S. Wetmore	Pittsford

EDNA S. BEACH, Secretary,
Charlotte, Vt.

Wednesday, January 10, 1906. 10 A. M.

Sec'y Davis:—Will Mr. S. L. Harris of Proctor come forward?

Sec'y Davis:—It gives me great pleasure and I consider it an honor to present to you in behalf of the Association this cup awarded for the best butter of this entire exhibit, which scores 98 points. You will also later receive a gold medal valued at fifty dollars.

Mr. Harris:—I thank you.

Sec'y Davis:—C. H. Cobb of Westford wins the dairy cup, and also the dairy sweepstakes. Score 97¾.

BUTTER FUND AND NAMES OF DONATORS.

Stoddard Mfg. Co., Rutland, Vt.....	\$ 25 00
Alderney Butter Color Co., New York	25 00
Worcester Salt Co., New York	15 00
Diamond Crystal Salt Co., St. Claire, Mich.....	15 00
J. B. Ford Co., Wyandotte, Mich.	10 00
L. M. Cameron, Montpelier	10 00
O. Bent, Boston	5 00
Geo. Cushman, Boston	5 00
F. L. Davis, North Pomfret	5 00
Butter sold C. F. Eddy and others	253 01
Association's money	440 14

Total butter fund.....\$808 15

The exhibit of butter and cheese was large and the quality fine, for winter goods.

The usual display of Dairy Machinery, butter-color and salt was exhibited in the Armory building in a room contiguous to the hall where the meetings were held. Under the new rules adopted by the Association, nearly every exhibitor of butter and cheese will receive a part of the premium fund. The officers extend thanks to all exhibitors of butter and cheese, and all supply men who have so generously helped to make the meeting a success.

The amount paid for each share was \$1.20.

The Gold Medal and Creamery Sweepstake Cup was won by S. L. Harris, Proctor, 98 points.

Dairy Sweepstake Cup, C. H. Cobb, Westford, 97¾ points.

ORIN BENT, }
GEO. L. CUSHMAN, } Judges.

Pres. Bruce:—The butter room will be open at the close of this session.

Pres. Bruce:—We have with us this morning one who is well known as the secretary of the State Grange. He is also a practical farmer, and a creamery manager, and will address you upon the subject, "Suggestions from a Creamery Manager to Dairymen." I now introduce to you Mr. A. A. Priest of Randolph.

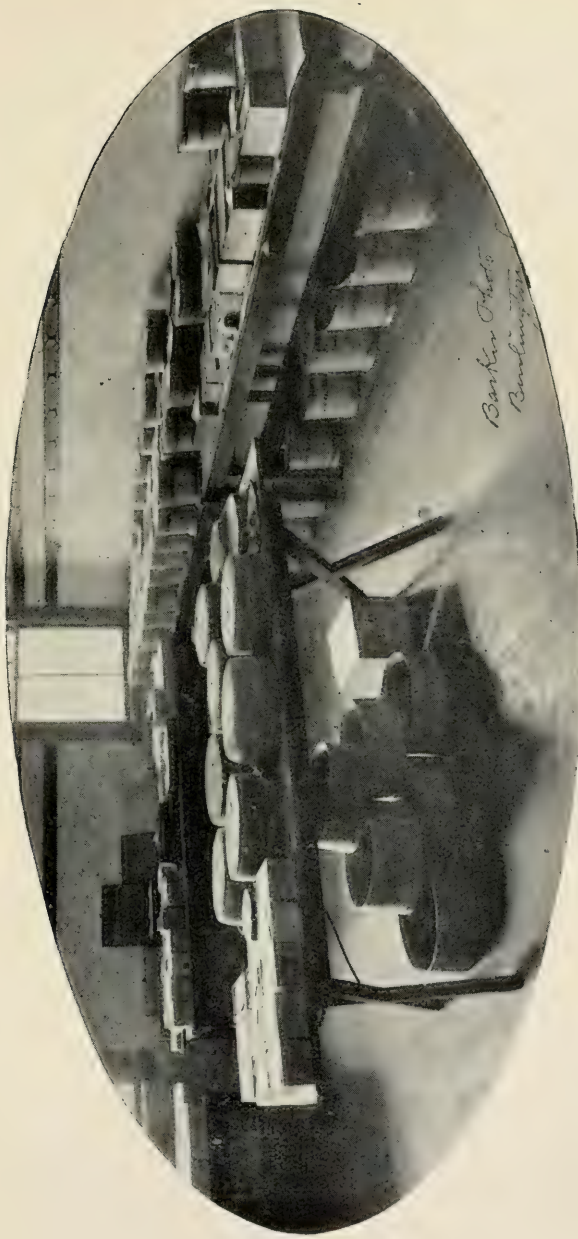
(Applause.)

SUGGESTIONS FROM A CREAMERY MANAGER TO DAIRYMEN.

A. A. PRIEST, RANDOLPH, VT.

Mr. President, ladies and gentlemen:—I shall be very brief in what I have to say. You have come here to hear experts along dairy lines and I am not foolish enough to think that I can entertain you. The dairy product of this country amounted in 1905 to \$665,000,000, exceeded in value only by the corn crop. Vermont farmers are principally engaged in dairying, probably three-fourths of them gaining a large part of their living directly or indirectly from the sales of the product of the dairy cow. The larger part of this product is made up at the creamery or cheese factory, principally the former. Hence it seems proper that we should get together at least once a year and discuss means of enhancing the value of our herds and increasing the quantity and quality of their products. When I said I was going up to the Dairymen's Association, someone remarked, "What is the use of going there; you can't learn anything; they rehearse the same thing over year after year, year in and year out." This may be in a measure true; but it is continual teaching that gets us out of the old ruts and leads us to adopt new and better methods in the feeding and in the care of our cattle, and in the manufacture of our butter. The Experiment Station,—and I believe that we have the best one in the United States and that no person has done so much for the farmers of the State of Vermont as its present director,—it has thus continually taught, through bulletin and lecture, so that nearly every farmer in the State of Vermont is practicing some of the methods thus laid down and are reaping the results by so doing. But we get our knowledge so slowly and in such a roundabout way, many times by patterning after the neighbor who is keeping in touch with these meetings and Stations that we do not give its source the least bit of credit. Instead of ignoring the scientific man, we should humbly sit at his feet.

While we admit that we have been making a great progress along many lines, are we making equally great progress in the quality of butter? If we judge by the scores read this morning,



*Barker Photo
Burlington*

BUTTER AND CHEESE ROOM.

one would not think there was any poor butter made in the State. But I was reading only a few days ago in the Dairy Journal the rules for making Convention butter; and I find these rules are not the ones used in making everyday creamery butter. Only five per cent of the large amount of butter that goes to New York grades as extras. If you follow the Boston Chamber of Commerce circular, you will find that every week there is a large proportion of off butter, and many weeks a very great proportion. This means an enormous loss to the farmers of this country, as well as to the consumer for if he cannot get a first class article of butter, he will often take an imitation at a less price.

My experience with the creamery business dates back about eight years. Until within a year or two, we took nothing but milk. This was seldom more than eighteen hours old, was skimmed at the creamery to the desired thickness, and made into butter the next day. During the six years we had hardly a half a dozen complaints about our butter; not but what it might have been off some days, but not sufficiently so to cause complaint. But a great change has taken place. The farmer has tired of carrying his milk from half a mile to five or six miles. He finds that there is a great drain, a great expense in keeping up his teams, that wear and tear is excessive, and also, if he is any like myself, that after he has spent a half day going to the creamery, he is good for little else the rest of the day. So the hand separator has been introduced. Now we are taking in cream of all ages from one to five days old, of all thicknesses from 10 to 40 percent, brought at all times of the day and night; and the creameryman and the buttermaker are expected to make just as good an article as ever and perhaps a better one.

Now, in case a poor can of milk is brought, the buttermaker does not hesitate to reject it. But he hesitates more about rejecting a can of cream for he knows very well that if he does, he will lose his patron. Competition is so close that a pretty poor article of cream may be got rid of. Everyone of our one hundred and fifty patrons can go equally as well to either of two creameries, some to three, some to four, and a very few of them to five. Each creamery stands ready to accept any and all the other's patrons if it can get them. We want to make butter enough to keep the cost at 2 cents a pound including the reserve. You might say that the creamery should have printed regulations and send a committee to visit the different dairies. That is all very well theoretically, but practically it does not work.

That there is so much poor butter is not the fault of the buttermaker. He is usually a good workman. The cause is inferior milk or cream. With expensive machinery and expert

help one can make a fairly good lot of butter from a pretty tough article of cream; but nice butter requires nice milk. If a patron brings a can of sour milk or cream that is not more than two days old in the summer, or three or four in the winter, its acidity is proof positive that he has neglected to take care of it in a proper way. He has either got too much filth in it or it has not been cooled down quick enough or low enough.

Filth is the great source of acidity in milk. It gets in in many ways. I once found a certain dairy making poor butter. The cause was unknown. A sample was taken from each cow, put into a jar, made perfectly clean by steam. Everything was perfectly clean and the milk was drawn under cleanly conditions. These jars were placed outside a barn in August,—the temperature must have been over 100°—and the milk remained sweet for more than four days.

If the farmer would observe just a few simple rules, we would not have this vast amount of poor butter. In the first place he should not keep the separator in the barn. Most of them are kept either in or near the cow stable where its odors and dust may enter the milk. He should not feed his cattle before milking, particularly with hay or silage. The dust from the hay getting into the pails and the separator may give rise to most undesirable bacterial troubles. Silage and cottonseed meal are cheap sources of food supply, yet I believe them responsible for much poor butter. Cottonseed meal makes it too tallowy and silage, certainly if it is very sour and fed to excess, imparts its taste to the butter. Cans, separator and everything about the dairy should be kept perfectly clean. The cows should be on drops, on platforms short enough and high enough so that no dirt can get upon them. It does seem as if the patron, knowing that so much poor butter is caused by his lack, and, that his inferior milk brings the quality of butter for that day down to his level, would do better; but often he doesn't.

One suggestion more and the most important of them all: Stick to your cooperative creamery. I have no fault to find with the many small creameries over the State where a farmer has fixed up a place at his house or barn and is making his neighbor's butter. He often has good success and may make a better product as cheaply as a larger cooperative creamery can. He has but a few patrons; they are his neighbors, they will have a little pride in bringing good milk, and besides he can teach them to bring better milk. But there is being established all over this country large proprietary creameries; they are buying out the cooperative creameries wherever they can; they do just as you and I would under like circumstances; they are there for what is

in it; and they pay less than do cooperative creameries unless competition compels them to do otherwise. A man has a few dollars, perhaps a hundred or two hundred in a cooperative creamery; he doesn't care much whether he ever gets it back or not. A very large amount of money is invested by a lesser number of individuals in a proprietary creamery and they are going to ask more for the work of butter making unless competition prevents it. Now with us in Randolph, our butter production has probably doubled in eight years. Before our cooperative creamery started there was a proprietary creamery there. It gave its patrons average butter quotations less four cents a pound for making. That was all right; it was the trade. Before we built our creamery, we asked that it be made for three cents and were told that it could not possibly be done for that sum. Yet, since we built we have paid probably on the average the highest quotations of the Boston Chamber of Commerce, and have charged only two cents for making; and the proprietary creamery has done about the same thing. Sometimes we vary a little, but that is just about the basis. We have made 2,500,000 pounds of butter at two cents per pound. If they have made the same amount the local farmers have been saved from fifty to one hundred thousand dollars. You would not think that a little community could stand any such drain, but Vermont can stand most anything and still be on top.

I have lived to be fifty years of age. I once thought Vermont was the poorest State in the Union; now, I think it is the best. We have stood the drain of some of our best boys and girls and the drain of thousands of dollars sent yearly to the West and other places never to come back; and still we are doing well and making money as our savings banks show. And if everyone of us would be as loyal to our State as is our present Governor, our farms would increase twenty-five per cent in value in a minute. Stick to your cooperative creameries. You may not like the manager or the buttermaker. Ascertain if you haven't some little personal prejudice against him; if not probably when the time comes round at the annual meeting, you easily will get him removed. The cooperative creameries in my opinion have been the salvation of the State, and of the farmers and we cannot afford to give them up. The milk routes are extending, yet I believe that it will be for our interests always to keep our cooperative creameries ready to run if they are closed up for this reason.

(Applause.)

DISCUSSION.

Pres. Bruce:—Do you strain your cream?

Mr. Priest:—Usually.

Pres. Bruce:—Will very sour cream pass the strainer?

Mr. Priest:—No.

Pres. Bruce:—I think it a good idea to strain all the gathered or delivered cream and to reject such as cannot be thus strained, and through a very fine strainer at that.

Mr. Priest:—If it is not strained, dry chunks will occur in some cream into which salt can never be incorporated, thus producing white specks in the butter.

Pres. Bruce:—Sometimes I use a coarser strainer when I think it well to do so, but Brother Stone over at Strafford wouldn't do that. I am rather a good natured fellow and they impose on me sometimes and bring me a little worse cream than they would to Mr. Stone; and so sometimes we take cream when we ought not to. But it seems to me that all cream should be strained or else returned and thus you will avoid all white specks in your butter.

A Member:—Do you pay cream patrons any more than you do milk patrons?

Mr. Priest:—We pay them just the same.

A Member:—Why is the over run with cream less than it is with milk?

Mr. Priest:—It isn't. It is the other way about it. It is more with cream than with milk.

A Member:—Do you use short, wide-necked or long, narrow-necked cream test bottles?

Mr. Priest:—We use the ordinary bottles bought of the Stoddard Mfg. Co., with necks nearly as long as those on the milk bottles.

Mr. Jackson:—Have you ever had patrons object to the test being read too high?

Mr. Priest:—We have much more fault found with the cream tests than we used to with the milk tests. The cream patrons are not so well satisfied as were the milk patrons.

A Member:—How do you take your cream samples?

Mr. Priest:—The cream comes mostly in a tall can that holds 80 pounds; I dip with a long handled dipper, stir it, then take from the top before it is turned into the weigh can.

A Member:—Do you think your buttermaker gives better tests to cream patrons than to milk patrons?

Mr. Priest:—Our man is a very conscientious fellow and he wouldn't cheat one of them, milk or cream, in any way. Yet

I am not always sure that the creams are properly mixed prior to sampling.

Prof. Decker:—In this connection note the McKay cream sampling device concerning which I spoke yesterday, which I hold here (showing it.) The use of such a device should obviate much of the doubt as to the accuracy of cream sampling.

A Member:—What proportion of your product is milk and what cream?

Mr. Priest:—It is now more than half cream.

A Member:—Do you churn gathered or delivered cream separately from that derived from the milk?

Mr. Priest:—No, it is all mixed together.

A Member:—Do you treat your ten percent cream differently than the 40 percent cream, or is it all dumped into the one vat?

Mr. Priest:—It is all put in one vat. But when there is much thin cream the churning is not as complete as is desirable and there is waste in the buttermilk.

A Member:—Is there any creamery man in the hall that receives thin cream from 10 to 20 percent? If there is, does he dump it into the milk vat and run it through the separator? And if so, what is the effect of running thin cream through the separator?

A Member:—I am manager for H. B. Hood & Son, a proprietary concern. We take in both cream and milk, dump the cream into the milk and run it all through the separator. If we get short of milk, we try not to run so much cream in at the same time. And if we get short of milk and quite a lot of cream comes in, we dump a lot of skimmmilk right back into the vat, and let it go through again,—we do not calculate to run cream that would test over twelve or fifteen percent.

A Member:—Do you not get more loss in your skim milk in that way?

A Member:—Not if properly handled and if one does not get too much cream in at one time.

Mr. Priest:—You do not pour in sour cream, do you?

Answer:—We let the patron take that back.

President Bruce: On account of the special meeting this afternoon of the Woman's Auxiliary, at which Mrs. Howie is to speak, the order of our programme will be changed that she may now talk to us concerning The Dairy Calf. Without introduction, I will call upon Mrs. Howie.

THE DAIRY CALF.

MRS. ADDIE HOWIE.

Gentlemen and Ladies: If we are to have profitable dairying, we surely must have cattle in our herd that will make us a profit and the progressive dairyman of today quickly sees that in order to do this, he must rear the animals that will comprise his herd. Now, I know some of you may ask "Wouldn't it be cheaper for me to go out and buy a heifer at two or three years rather than raise her?" And I will tell you right here, "No." Because if you go out to buy that heifer of a first-class breeder or dairyman, he has brought it up in the proper manner and he will understand the value of his work and he will charge you accordingly. If you go to a second or third-class breeder or dairyman, what are you likely to get? The heifer will not be worth putting in your herd and your time and money are both wasted. Therefore, if you are really in earnest and determined to have the proper dairy workers, you must raise them yourself.

I can understand the prejudice in your minds against a woman telling a man how to raise a dairy animal. But I am going to ask you right here to give this matter just a little bit of earnest thought, and if you will for one minute consider it, you will all remember that the calf that mother and the girls raised always made the best cow. Why was it? Not because mother and the girls were wiser. Oh, no; no woman ever attempts to think that. Not because mother and the girls were wiser or more determined in their efforts to bring about good results, but because there is a bond of sympathy between the human and the bovine mother, the bond of motherhood. Therefore, I sincerely believe that the woman is better calculated to look after the interests of the cow than is a man.

A noted man was once asked when to begin the training of a child, and the answer was "Two hundred years before it is born." Yes, stop and think a bit! Two hundred years of honor and valor on one side, and 200 years of culture and refinement on the other! Wouldn't that go a long ways toward giving the

little one a good start in the opinion of his fellow men. And this same principle you may apply to the rearing of our cattle; because we should go back into ancestry and study up the characteristics of the animal that we wish to perpetuate. In the first place, let us give this dairy business more thought than we usually do. Let us ask ourselves what branch we wish to follow, because there are several lines in dairying. Don't think because you have a bunch of cows that you are a dairyman, because if you haven't an animal suited to the purpose of the line you wish to follow, you are not strictly up to date, and you are not making the most profit from your herd. If you were to plough a field, would you go to the machine shop and say to the proprietor, "I am going to do some farming and I think I will plough a field; I would like a piece of machinery." Is that what you would ask for? The man would say "I haven't a plough right around handy, but I have a rake, you can scratch the ground up a bit with a rake." Yes, you could scratch the ground up, but you couldn't turn a good furrow. Get a line of cattle and a breed of cattle that is adapted to the branch of work you wish to follow. Now, if you are going to produce a large quantity of milk, perhaps sell it for so much a quart, we have a breed perfectly adapted for that purpose. If you wish to produce the finest butter and cream in the world, we have a couple of breeds adapted to that purpose, and it won't be necessary to pasteurize the cream either to make a first-class article of butter. If you on the other hand wish to make the very finest flavored cheese in the world, we also have a breed adapted for that purpose. Now, find out what you wish to do and then get your cattle with that in view. If you wish to produce a large flow of milk, you have nothing better than the Holstein. They will serve your purpose well and faithfully. If on the other hand, you would make the finest quality of butter and cream, I can safely recommend the Jersey and Guernsey; there you have two breeds to select from. But if your ambition is to make the finest flavored cheese in the world, then pin your faith to the Ayrshire and she will not disappoint you.

Now, when you have decided what line you wish to follow—perhaps some of you will think, "Oh, she is going to advise us all to go into the butter business and to get Jerseys and put away our common stock." I don't know if you have any common stock; I have seen some pretty good stock here in Vermont; but if you are like the Wisconsin farmer, some of you have common stock. "Yes, she is going to tell us to do that and tell us to get pure bred stock." I am not going to tell you anything of the kind, because I haven't quite faith enough in the American dairyman to trust fancy bred stock to him unless he understands

its characteristics; but I am going to urge upon you the necessity of breeding up your herds and breeding them up carefully and with an object in view.

In the first place, when you have decided what line of work you are to follow, even if you have ordinary cows, I am going to ask you to put a pure bred sire at the head of that herd and breed up. I have known men to go to Farmers' Institutes and Dairymen's Associations, and go home with a very laudable ambition to build up their herds, and I have known them to think of getting a pure bred sire; and perhaps some neighbor would come along and say, "Where are you going to get him?" "Oh, you know I have nothing but common stock, and I want to breed up; but I know a breeder who has pure bred stock. He has pedigrees—pedigrees seven miles long,—and he has some animals that aren't quite good enough for a breeder, but they are good enough for me because I have common stock."

Now, be careful, be careful! You may not be building up your herd; you may be tearing down even the common stock that you have. In the first place, perhaps this breeder is sincere. Nowadays they breed for hair and hoofs and hide and horns. Those are not the milk qualities that we wish to perpetuate; but when those are what they are breeding for, they may look at the fancy points quite as much as they do at other things.

Let us see,—What must we have in a profitable dairy worker? The first thing is constitution. Never let your eye get from that one thing, constitution, in your daily herds if you are to have profitable workers; therefore when you look at this animal—and I would advise you to look at him—if he is lack-lustred eyed, hide bound, and the breeder says he is gentle, then hesitate. Of course he is gentle; he hasn't life enough to be anything else, but gentlemen, don't touch him; don't touch him, not if he offers him for ten shillings. He would be better under ground. But if on the contrary, the breeder says, "Yes, I have something," and he has a splash of white on him,—and these people who are breeding for fancy colors think of these things,—and he has large nostrils in order that he may breathe in quantities of oxygen, if he has a broad chest, plenty of heart room, has a soft mellow hide and has an altogether vigorous appearance, with a bright eye, you may safely put him at the head of your herd and you are well on the road to improvement.

But I have known people to perhaps have an animal of this kind at the head of the herd for a year or so and a neighbor would come along and say, "Hm, I see you are breeding up your herd. Well, that's a good idea; but what under the sun did you get that measly runt of a Jersey for? Don't you know that when you take those animals to the stock yard after they are

through milking, why you won't get anything for the carcasses?" What do you want anything for the carcass for? If you figure up your accounts with a first-class dairy animal, you will find you can well afford if need be to bury her when she dies, because she has left you a good legacy. Don't count her on carcass, because if you have done as you ought, you will find you have a real affection for that cow by the time she is 12 or 13 years old, and you won't want to send her off to the stock yards; you will give her a decent burial. "What do you have that runt of a Jersey for?" "Well, it's all right; the Jerseys are rich, no getting around that, and you have done pretty well; but I will tell you what you ought to do now. You should have a Holstein and you will get a large flow of milk and you will have something just fine for a dairy." Then the Jersey will be discarded and in just a year or two another neighbor will pass by and he will say, "Ah, I see you are on the way to having pure bred cattle. Now you have some Jerseys there and you have some Holsteins; that is all right; you have the richness and the flow of milk; but if I were you I would not have that big kind of a cow. I will tell you what I would do; the Jerseys are too small, and if I were you I would get Guernseys. They are larger than the Jerseys; and he puts the Guernsey at the head of the herd. And what has he done? He has not built up anything. He has made a mongrel of them all. Now, when you come to build up your herds, do it in a symmetrical manner. Do it as you would lay out land for ploughing,—put a little white flag at the end and keep your eye on that flag. You know you might hit a stone, but you will keep your eye on the flag and come back into line. Do this with your breeding, breed carefully to the line, and then in a few years, you will have a herd of pure bred cattle,—not eligible to registry, but for every other purpose equal to the pure bred cattle; and you can well afford to do it.

When you have the sire carefully selected, look well to the mother. These mothers have a way of leaving their imprint on the offspring. Look well to the mother. See that she has constitution and that she is a persistent milker. Now the cow that will give a full pail of milk, and dwindle down, and in six months go dry and board with you the rest of the year, is not a profitable dairy worker; but the cow that will give you a reasonable flow of reasonably rich milk for at least ten months in the year is a good animal to breed from. Now, if this mother has been carefully fed and cared for, when the little creature comes into the world, it will be a wild-eyed, lively little thing. And now I am going to ask you right here at the start, when you go out to the barn some morning and the little thing comes nosing

about you, that you don't give it a rude push and push it away from you, because the dairyman and his working partners must be on the best of terms if this is to be a successful business. You must make it welcome from the very start. Let it see that you are its friend.

I have known some of the more ambitious farmers and breeders too, who, when they would see the markings of the pure bred animal, were so proud, and had such ambition to do just what was right for that animal, that perhaps they would lose faith in their own judgment and might call in some neighbor who was quite a breeder of cattle, as he passed by. And he would say, "Here, we have a new calf. It is a new breed, and I tell you it's a dandy. Now I want to do just the right thing. Would you take it away from its mother at once, or would you leave it?" And this breeder would say, "I've been breeding cattle nigh on to 40 years, and the best thing you can do is to take it away at once, because if you don't maybe she will hold up her milk" or something of that kind. And I have come way from Wisconsin to say to you "Don't do it, don't you do it." And then you will say, "That is all nonsense, you might have expected that from a woman; a woman can't talk business; she talks sentiment." And then I will tell you, "Yes, I am going to talk sentiment and business and common sense." I am going to give you three reasons why you should leave that little one with its mother for at least three days, and four or five wouldn't do it any harm. In the first place I will give you the woman's reason—because. That may be all sentiment. And in the second,—and if you are like the Wisconsin people, this will appeal to you—because this reason is one of cold dollars and cents, because in Wisconsin if we can jingle the dollars and cents in our pocket, we can get the farmer's attention. And then I am going to give you still another reason, and this is common sense. And now you may shake them all up, toss them up, and take your choice or leave them alone.

In the first place I would leave the calf with the mother three days because the mother is entitled to it for that length of time. And that is the woman's reason.

And the next reason is the hard, cold dollars and cents. If you have the type of cow that I have in mind, and she is a heavy and rich milker, she will be nervous and excitable; she will be of a highly nervous temperament, and if you take that little one away from her, she will become nervous, perhaps her temperature will rise, and you will have a case of milk fever in your herd, and if you ever have that, you won't want to see it there again; and if you lose your cow, it will means dollars and cents to you. Therefore I would leave it with the mother.

And now the common sense reason, and after all this is the scientific reason, and if we are to get the best results, we ought to work both scientifically and practically, and this reason is because Nature has stored up in the udder of the cow a secretion called the colostrum, which is intended to regulate the digestive organs of this calf and start it well on the road to a successful life.

Now if we leave the calf with the mother and it gets this provision of Nature at proper intervals and at proper temperature, you have it well started when we take it in hand. That is common sense. And then if it is strong and lively, you could take it away at three or four days. Yes, even a woman will admit that she must do that if she is to have the proper dairy worker, and even women are not in the business for their health entirely; therefore she will take it away then. Well, how will you do it? If you are a man and in a hurry and you don't think very much, you will pick that calf up and go and put it in a pen, and then you will turn the mother out and she will go bellowing around the barn and crying; and if you are a kind-hearted man—and I have known some who didn't like to hear it—you would have an excuse to go off to some neighbor's; but your wife and children would hear it just the same. Now, I am going to tell you how mother and the girls would do. Women are not very smart, but they are awfully shrewd sometimes. Mother and the girls would make a little pen across the corner of the box stall, high enough so the calf could not nurse the mother, and yet at such height that the mother might come and fondle it to her heart's content; and then they would open the door and turn her out into the yard for water or with the other cattle and in just a few minutes, you all know, she will come back wild-eyed and terror stricken, because these progressive Americans have bred terror into our cattle, terror of separation from their little ones; but if we are to be really progressive, let us breed that out,—leave the door open to the box stall and when she comes in speak kindly to her, pet the little one, let her see that you are its friend, and I have known them in just a day or two to go back to the long row of stalls, take their place there and turn the little one over to you.

Now, you have it to take care of. What are you going to do? Well, you are going to say "That is a fine calf and I am not going to be stingy with that calf. I am going to give it just all it wants because I am going to bring it up right now." Be careful, be careful! What are you going to do first? You are going to teach it how to drink. And do you know I once knew a very nice man who belonged to the church, and wouldn't swear, only under great provocation, and he told me he would rather

plough all day long than to teach a measly calf how to drink. And I think he would by the way he went about it. I watched him. He rolled up his sleeves as though he was going to a prize fight. I never went to a prize fight, but I always fancied I would roll up my sleeves. Then he took a pail, and he marched out to the barn. The poor little thing had never looked down for its meals and it didn't just know what to do, so it eyed the man, and he stepped up in front of it and he put down the pail, and he grabbed it and threw one leg over its neck and he rammed its nose into the pail until the bubbles came up, and of course the calf kicked,—wouldn't you? I think if you were breathing milk into your lungs instead of air that you would make resistance. And, of course, it took him quite a while to get the calf used to such treatment.

Now I will tell you how mother and the girls would do. As I said before, they aren't smart, but they are shrewd, and they would begin at the very outset to flatter that calf. They would tell it it was the sweetest thing, the dearest thing that ever came to the herd; and it would believe them, because you can flatter a calf almost as easily as you can a man. (Applause.) Yes, you can. And then they would get it off in a corner, quietly back it down while they were talking to it,—why, I have actually known women to get men in a corner and manage them so beautifully that they never knew they were being managed at all,—and then they would put the fingers in the milk and they would bend the head a little lower until the lips grasped the fingers and began to draw up the milk,—the nostrils weren't plunged in the milk, and I have known them to learn to drink in just one lesson. Sometimes it requires more, but you must use patience and patience will pay you big dividends in the cow barn.

Now, you have it drinking, how much will you give it? It is a fine grade and you won't be stingy with that calf. Be careful! Don't you know that a calf's stomach is very small and that if you distend it unnaturally with a large quantity of milk, you are going to bring on trouble right away? Therefore I ask you to measure that milk carefully for the first three weeks; feed it no more than two quarts at a single feed, and feed it three times a day so that you don't feed it too much at a time for the first three weeks. Now, if it isn't very strong, feed it less than that quantity, don't feed it quite so much. At the most that will be six quarts a day and no more. At the end of the first week, you may add some skim milk; at the end of the second week, the entire amount may be skim milk; and at the end of the third week, it may be divided into night and morning feeds.

Ninety-eight degrees is the proper temperature for feeding, and it must be fed from a clean pail. There are three things that you must observe in feeding. Now, don't set down that pail of milk which is 98°, if you happen to see a neighbor passing and want to talk with him 10 or 15 minutes, and then go back and feed that milk to the calf; because if you do it will have colic just as sure as will a baby. Well, you have it fed on skim milk; from the very day of its birth, offer it some nice, clean hay. Don't throw it down anywhere and let it become soiled and smelly and then ask the calf to eat it. If you do, you will have trouble right here. Put it up in a little rack in the pen and let the calf draw it from that as he wants it. I have noticed them a few hours old chewing by the side of the mother. We want to develop that habit of cud chewing because it is essential to a dairy worker. When it is nine or ten days old, after it has had its milk, you might put in a very little oats. Now you have it on skim milk, oats and hay; that is all that you require. You don't need to put in any oil meal to take the place of the butter fat. We don't need that in the dairy calf, because we have left all the muscle growing elements right in the milk, the casein, the sugar—the solids all there, we have only removed the fat, therefore the skim milk is the ideal food for this calf.

Now, there is another very essential thing and next to over-feeding, I think it has killed more calves than any other, and that is dirty, filthy calf pens. Don't be satisfied to go out to your barn and sprinkle a little fresh straw over the calf pen because it looks clean. Take your shovel and dig down. No healthy creature could thrive on what you would find,—no healthy creature can thrive on a wet, smelly bed. If you don't believe it, try it for a night or two and see.

Now you have that calf in ideal condition, it it has plenty of sunlight, room enough to stretch its muscles,—and to develop. But I shouldn't think the calf was raised until maturity is reached, so I am going to tax your patience a few minutes longer.

In Wisconsin, the fall and winter calves are kept in the barn until after the first succulence of grass is over. We never turn them out on the first grass because it is too succulent and will cause trouble. Wait until it is dried down. Be sure and give them plenty of water. Offer it to them. We want our dairy animals to drink large quantities of water, not alone because milk is 80 percent water, but large quantities of water will flush the system and carry away any feverish effects; therefore you should encourage your cattle to drink large quantities of water. Then there is another reason,—if we are inducing our cattle to put the water into the milk, it may save our consciences quite a strain later on. The Connecticut rule is 60 quarts of water a day. And

you should strive to get them up to that point if possible. Be sure she has a shelter from severe storms, and has shade from the sun; and if you have the right kind of a calf, when she is about a year old, take away her corn and make her satisfied on roughage. I say this because if she gets in the habit of satisfying her appetite on grain, she won't develop the barrel we want, and which Prof. Dean doesn't like to see. We want her to develop a barrel so that she can put plenty of roughage into it and turn it into milk, and on roughage we can make the cow last longer than we can if we feed her heavily on the concentrates. So let us teach her to consume large quantities of roughage. Be sure that the pasture contains this roughage, and induce her to eat all that you can. She may safely measure her own roughage.

Now, with these early maturing breeds, and it is the only breed I know anything about, I would say to you that if you are satisfied with a beautiful type of cow, if you are quite satisfied with hundreds of years of careful breeding and selection that have been given this animal, and are pleased with her yield of cream and don't care to increase the flow of milk to any great extent, then I would ask you to have her become a producer at the age of 20 to 22 months. But if on the other hand you are a grasping American and you want a big bulky frame, a big, big flow of milk, then you may wait a while, and you will not have the Island type, but you will have distinctly an American type, and you will raise the quantity of your milk at the expense of the butter fat, and you will also be apt to have some shy breeders in your herd. There is the warning. You can do as you like. I prefer then to be producers at the age of 20 to 22 months. If you wish to rest them, rest them between the first and second calf, because we wish to prolong that milking period. Give the dairy cow special care,—of course you have petted her all this time; that is a big part of the bringing up of a dairy animal; you have petted her; when she sees you coming, she runs to meet you; you are always speaking to her kindly and she knows you are her friend.

And now I am going to ask a few other things of you. I am going to ask you to give her a stall; make her feel her importance; let her see that she has a place in your affection. And now I am going to ask you another thing and you will say "That is a woman's reason." I am going to ask you to curry her, groom her. I hear someone say "That woman thinks that we men have nothing on earth to do,—we can't get our horses curried half the time we are so busy and here she asks us to curry our cows; I suppose she wants to see them look nice and slick." Yes, I do; but I am going to give you some good, hard reasons for this. I am going to give you the dollars and

cents reason, and the woman's reason. Yes, we like to see them nice and slick just as you like to see any living creature clean, and neatly dressed. That is the woman's reason. Then there is another reason: A sense of honor should make us produce this article of human food in the most cleanly way possible. That is the reason. And then there is still another reason: The hard dollars and cents side, no humanity in this or anything of the kind. If you should curry that animal, and if you should groom her, you will stimulate her circulation and you will have a thriftier, hardier animal and she will be able to work more faithfully for you and produce a better quality and quantity of milk. Yes, groom her; handle the udder and familiarize her with the milking process and then when she freshens there will be no tying up, no kicking you off the milking stool and tempting you to say bad things in the barn,—nothing of that kind. She will step around a bit as she hears the milk falling into the pail; but if she knows you are a friend and hears your voice, she will stand quietly; and I have known them in just a day or two to stand there chewing their cuds like an old cow.

And even now I can't quite leave her. I guess somebody else has the cow a little later on,—but I can't leave her right here,—I won't touch upon the cow, but I must take my heifer one step further, and I am going to ask something dreadful of you Americans. I am going to ask you to go back to the old countries and get some of their methods. I know that is pretty hard for an American to swallow; but I am going to ask you if you ever knew of any of the old countries importing any of our dairy cattle to their lands, and then I am going to ask how many of their dairy cattle we bring over here and why we do it. I am going to ask you to milk this heifer three times a day. And that is awful. But I am going to tell you why. Didn't you bring her up extraordinary? Didn't you breed her to give a large flow of milk? And haven't you encouraged her in all those ways to give you a fine yield? And oh, now that she does it, have sense enough to take it from her. Had you left the calf with her, it would have relieved that udder from time to time; but now she stands there, and if you milk her but twice a day, and she is secreting the milk and it is not taken away from her, it will go through her system and it will make her feverish and nervous and perhaps she will lose in quantity, and then you will say, "Oh, pshaw! those pure bred cattle are no good; they are tender; they are no better than common stock; I don't know why I was ever tempted to go into it." Of course they are no good, if you stop short there. Keep on developing them and see.

A few years ago I had the honor and the pleasure of being invited to look upon one of the finest herds in the Western States. The owner was a very wealthy man and took great pride in his cattle and his fame. He said to me "The ambition of my life is to walk between my own plough handles"—and he was a man who commanded a salary as large as that of the President of the United States, yet he couldn't afford to be a farmer, and was waiting until he could afford to walk between his own plough handles. And so I visited the herd because he was so proud of it, and he said to me as we walked towards the barn,— "Oh, I have a dandy little heifer; she freshened the other day and I want you to see her; I want to see what you think of her." And he called to his herdsman, "John, bring up the cattle, I want Mrs. Howie to see that heifer." And up the lane they came. It was one of the most beautiful sights I have ever seen,— one hundred head, perfect as to type, and beautiful as to color. Up they came and the owner looked here and there for the little heifer, and finally off in one corner we saw a little creature with her head down, her eyes a little bloodshot, lifting one leg and then the other in perfect agony, and he said, "There, there she is. What do you think of her?" "What do I think of her? I think it the most pitiable sight I have ever seen. Why don't you milk her?" "John, Mrs. Howie asks why you don't milk that heifer." And what do you suppose John said,— "Because it isn't milking time." Oh, man, man! Here was a herdsman, commanding the highest price because of his superior skill as a feeder, as a herdsman, and he didn't know enough to milk that heifer, though she was secreting the milk faster than she could take care of it. Didn't he know that? Didn't he know that the udder was caking and coming to harm,—that it was going through her system and making her feverish and sick and after a while she would fail to give the quantity that she did at first? He should have known those things. Therefore I beg of you to milk that heifer three times a day for at least five weeks until the udder will contain all the milk that it will secrete, and will hold it without inconvenience. For the first year, milk her up as near as possible to the second freshening. If she doesn't give much and you think it isn't worth while to bother with her and that you had better dry her, don't you do it. You are training her for a profitable dairy worker and if you do dry her, she will dry the next year at the same time, and you haven't the persistent dairy worker that you want in your herd. Milk her up as near as possible to the second freshening, and then perhaps the second year she won't do any better than she did the first year; and you will say "I guess I have wasted my time." Wait a bit. Milk her to within two months of the third freshening;

then dry her, and then when she freshens for the third time, you will have such a cow as the next speaker, or somebody else who is going to talk, will tell you about.

Now, I am very fond of you people in Vermont, and I wouldn't like to give you gentlemen too great a shock or else I would tell you right here that all of the fancy dairy cows in the world are developed by women. Are developed by women. I didn't know that myself until a few years ago. And if you doubt me I would like to take you to Denmark and Sweden, to England, to Scotland, to France and Belgium, and to the Islands of the Jerseys and Guernseys.

A noted historian has written that centuries of gentle care under the management of women wrought this marvel of excellence. I would like to take you to Denmark where they give their cattle proper esteem. Why do you know that in Sweden the very cow bells are embellished with the highest skill of the engraver's art and they are handed down as a precious legacy for generations and generations, for hundreds of years. Think of it,—we Americans with our cattle. And then to Holland, where those big black and white cattle thrive. I would like to take you to Holland because the barns are so beautifully clean there; and the women care for them. And you will find the floors sanded and you may run your finger along the sills and you cannot find a bit of dust; and then those beautiful cattle,—so healthy, so loved and petted, so brushed and tended that the master and his hired men may safely sleep beneath the same roof. I once told this at a meeting in Wisconsin, and a man jumped up in the audience, and he said, "You come here to teach progression, and progressive methods, and you advocate that we live in a cow barn?" And I said, "Oh, no, sir, I do not." I didn't want that man in my cow barn, I tell you right here. "But I would advocate a condition," I said, "so perfect that it would not be detrimental to anyone to live in a cow barn." That is true; and do you know I believe if that man had been compelled to live in the barn with good, wholesome dairy cows, he would have been elevated. We call ourselves progressive Americans; do you know what would be a better term? Conceited Americans,—because we think anything we do is all right; we are hustlers; we are in America. There is one thing, my friends, you cannot hustle, if you are going to make a success of it and that is the dairy business. You can't hustle the old dairy cow. You have got to give her time to swing that big udder up the lane. If we progressive men were not content to be satisfied with our meagre knowledge of cattle breeding, we would go over to those old countries and we would wring from those women the entire secret of their success, and then we

would bring it back to our own country, and we would put on a few Yankee quirks and we would be up on the ladder as now we are beginning down where they left off a hundred years ago.

I have brought a model of a cow stall and anyone can examine who wishes. It is a very simple thing and it will save you a great deal of work. There is no patent on it. It is something we have in our barn and I hope everybody who looks at it will put it in their barn; it will cost you nothing to do so.

A Member:—When the calf is with the cow, is it able to take care of all the milk?

Mrs. Howie:—Very seldom, I am obliged to milk the cow even when the calf is with her; but the calf gets enough to regulate the digestive organs. We try to get it to take as much of the first milk as possible.

A Member:—How many times do you milk her?

Mrs. Howie:—That depends upon the amount of milk she gives. We never milk her perfectly dry until after the third or fourth day. If we think the calf is getting too much—and you see you have to be pretty familiar with cow knowledge,—we may milk the cow before and let the calf take the milk as it comes in later.

A Member:—How many pounds of milk do your cows average?

Mrs. Howie:—Now, I couldn't tell you exactly at the present time, because I have about twenty heifers among them, and they vary. We have one little heifer with her first calf and she gives from 16 to 18 pounds of five per cent milk a day. Those heifers are like a great many men and women. They don't crop out every day in the year, but when you do get one, you feel you have been well rewarded for a lot of time and work spent with the rest of the herd. We have over 60 head. We keep a record of every cow in the herd. The milk is weighed night and morning, and we gage strictly by the milk pail and the Babcock test. I have a few cows that I am very proud of; some that will give me 10,000 pounds of milk a year and it isn't water either.

A Member:—(Referring to the model stall). How near to the floor do you bring the partitions in these stalls?

Mrs. Howie:—About a foot above the floor so that when the cow wants to lie down she may stretch her legs.

A Member:—Why is the cow not milked perfectly clean at first?

Mrs. Howie:—Because we don't wish to take all the milk, fearing milk fever. It might put the cow in a state of collapse. We leave a little and let it gather.

I am going to tell you something I learned from the old country. Some years ago, in the early stages of my dairying when I knew a cow so well that I was satisfied to look at her through the fence and not go on the other side; when I thought that no woman should set her foot in the cow barn without she went to call the men to dinner, and then to get out as fast as she could; when I believed that a woman's sole mission was to wash milk pans, and see to the butter, and occasionally to ask her husband if he made a good sum on it; when I believed all those things and got a little tired of dairying, I began to think there might be some lines in life a little bit brighter than washing milk pans, sending butter to market and having the money go into another pocket. So one day I had a streak of aristocracy come over me and I wanted to learn something. I thought that I would make my farm just a little bit different from somebody else's farm, and that if I had a dairymaid that would be the proper thing. So I advertised in the paper, a city paper,—“Wanted: A capable dairymaid.” Then I sat down to wait for the responses. We had a woman on the farm, whose husband worked on the farm, while she did the house work. She came over with a bit of paper in her hand, and said “I see you have advertised for a dairymaid. I was a dairymaid in the old country. Could I be your dairymaid?” And I looked at her. She wasn't a handsome woman and I wanted something real striking. I had an idea of a younger woman with a little white apron and cap, and shining milk pail, that would make all the city people so envious that maybe they would buy the farm, and I would get off. I went to the city and a lot of foreign women answered. Some of them looked hard and some didn't, and I was fond of my cows, and mind you I only had three little Jerseys. Fancy a woman with three cows advertising for a dairymaid. I did wish I could be a little nearer them and I thought if I had a dairymaid it wouldn't be so much harm for a woman to step into the barn; so that is why I advertised. I was pretty nearly discouraged, after eight or nine of these people had come and I didn't see one face that I wanted to trust my Jerseys with,—but finally the bell rang and as I was showing one applicant out, there stood a nice, bonnie, sunny Scotch girl. Yes, she was all that, sweet and wholesome; you could have trusted anything to that girl and she held in her hand my advertisement, and she said “Madam, I came to apply for this position.” And I looked at her, and of course the less you know the more airs you put on; and I said “Are you sure you are capable?” “I think so,

Madam." "Have you references?" She hesitated a minute, and then she said "Yes." "Oh, you have"—I had noticed the hesitation—"Give me your references." She said "I was dairymaid on the Duke of Fife's place in Scotland." Oh, I thought, that is quite aristocratic enough for me and my thought went back to the three Jersey cows and a rather ordinary barn and so I said "How long have you been in this country?" "Three years." "Have you never tried for a position in this country?" "Yes, I had one position." "You had one? And why didn't you stay?" "I didn't like it, Madam; I didn't like the way they treated their cattle. They had a dog and they let him chase them up the lane and down the lane, and their barns weren't nice, and they weren't clean, and I didn't like it Madam." And then I thought of my barn and I wondered if she would like my barn; I didn't step into it myself, and I am not sure it was very clean, and I said,— "You didn't like it?" and then she said "But in Scotland, oh, in Scotland we have beautiful cattle; they give so much milk!" And I thought "Oh, you bragging old Scotchman, what are you doing here?" I thought "Why haven't we the same cattle in this country; we certainly import them, we pay big prices for them, what is the difference between our cattle and Scotland's cattle?" It wasn't the cattle; it was the people I found later on. So I said "Why do your cattle give so much milk? Why are your cattle better than our cattle?" "Because, madam, we love our cattle." I knew her secret then. "Because, Madam, we love our cattle; why, we milk our cattle always three times a day." "Three times a day,—why, I never heard of such a thing in America. You milk three times a day?" "Yes, in Scotland, there is an old adage, and it says 'The more you milk, the more you may,' " and I know by my own experience that if you will milk your cows three times a day you will raise the quantity from two to four pounds, and you will raise the percent of butter from a half to one percent; that will pay you in dollars and cents. So she says we love our cattle, and I have milked eight times a day. Yes, Madam, my father was herdsman to the Duke of Fife and when we had some of those beautiful cows freshen, he would say 'Jean, take her', and I would get up in the night and relieve her udder, because we didn't want to see her blemished in any way." I talked to that girl, and I had my eyes opened to cattle breeding and dairying and I have studied ever since.

(Applause.)

You will all want to know if I hired that girl and I will tell you right here I didn't because I was ashamed to until I had improved my methods; but I went home to the German woman,—she looked good enough to me at night,—and I said "You were

a dairymaid in the old country?" "Yes, Madam, I was." And I said "How many times a day did you milk in Germany?" "Three times a day, Madam, and we got much milk." I said "Will you milk my cows three times a day?" "Sure." And I engaged her on the spot. And all that summer I was that woman's shadow and when she fed a calf and would stroke its back, I said "What do you do that for?" "So she won't eat so fast and get gas on its stomach and colic;" and so no wonder the women raised those fine cattle.

(Applause.)

President Bruce:—We are now to listen to Mr. Herbert Lyster of Wells River, who will address you on his views on the care of the creamery. I take great pleasure in introducing him to you.

MY VIEWS ON THE CARE OF THE CREAMERY.

HERBERT L. LYSTER, WELLS RIVER, VT.

The average Vermont Creamery represents an outlay of at least \$4000, and upon the butter maker falls the responsibility of preserving it in as sanitary a condition and with as little deterioration in value, appearance and condition as possible. The two most destructive forces with which he has to contend are rot and rust. Rot attacks the wooden parts of the building and equipment, and rust the greater part of the rest. Wherever either or both of these agents are at work, sanitary conditions are impossible. The causes of rust are salt and water, while rot is caused chiefly by decomposing milk or excessive moisture. To preserve the creamery and its equipment, we must have all exposed surfaces, where practicable, well painted and kept so. Moisture must be reduced as much as possible, and milk must never be allowed to remain on wooden surfaces such as walls and floors. Boiling water combined with soap and used with intelligence and muscular force will be found the best means of securing hygienic conditions.

A creamery soon acquires a reputation for good appearance and clean smelling interior, or else for an indifferent, dirty, run-down look, and a smell that would never be mistaken for the odor of roses, while the demand for its butter ascends in an inverse ratio—its reputation descends. The majority of our creameries are in a respectable condition; quite a number are head and shoulders above these in all respects; while a few, I regret to say, are actually filthy and entirely unfit to have anything to do with the manufacture or handling of an article of food that is eaten, in what we may term a raw state. A gentleman who has occasion to call frequently on the greater number of our creameries told me of visiting one last July which actually put to rout his driver who had sauntered in smoking a cigarette. He beat a hasty retreat and, as he flung away his cigarette, said he felt like the skunk who roaming along the roadside as an automobile passed, and as the gasoline smell was wafted back in his face, remarked "What's the use of my living now?"

Most of our creameries are sheathed on the inside walls and ceiling. This should be kept well varnished or painted a light color similar to the original color of the cream vat or churn. With a tight fitting cover for the cream vat or churn, the smell of paint or varnish is not to be feared. The exterior of cream vats, churn and worker should be painted yearly. This is best done in the fall when the flies have been disposed of and before cold weather sets in and an over supply of moisture causes the sheathing and woodwork to become too damp. The inner tin compartment of all cream vats should be removed and the under surface washed and painted before replacing to prevent spots of rust forming, thereby causing pinholes to appear in the bottom of the vat. If black iron piping has been used in the creamery, I would coat it with black asphaltum varnish (which dries with a hard, smooth surface in five hours) trimming the elbows and valves with aluminum paint which prevents the pipes from rusting and adds greatly to the appearance of the interior. If galvanized or white iron piping has been used, I would use aluminum paint entirely, as it gives a brighter appearance and the galvanized surface underneath will not rust and spot the aluminum finish as would occur with black iron piping. For the boiler room, I would have the brick work painted red which covers all mortar spots, giving the entire surface a bright, new, pleasant effect. The smoke stack, arch front, piping and exposed surface of the boiler may be painted with black asphaltum, trimming valves, injector, elbows, etc., with aluminum. This should be done in the spring, and it will look well all summer and most of the following winter.

Where the skim milk is drawn into the cans, if inside the building, I would have the walls lined up for about three feet from the floor with zinc or galvanized iron which protects the wood work from spattering milk, being easily rinsed off before the milk dries on. A strip of cheese cloth spread over part of the top of the weigh can on the side where milk is poured in, and held in place by a half inch leather strap buckled tight around the top of the can, and used as a strainer will do away with most of the spattering in the weigh room. Where the boiler is fifteen H. P. or larger, I would advise having a three-quarter inch pipe leading from the bottom of it to the main room in the creamery, where a valve should be placed. I would then have enough five-ply steam hose to reach to all parts of the main building. With this arrangement, the sediment in the boiler is kept blown out, and a supply of boiling water under pressure may be had to wash under vats and in small corners and other places difficult to clean. The engine should be wiped with cot-

ton waste and covered with a blanket of some cheap dark-colored cloth to keep dirt out of the wearing parts.

On account of the prevalence of oil on the engine, and also on the separator, I have found they may be kept looking cleanest and best by simply wiping clean with cotton waste rather than by washing with soap and water. Cracked cement floors should not be tolerated for any length of time, as milk and filth soak into the cracks, causing unpleasant odors.

Steam should not be allowed to escape and condense in the room or black mold will appear on the walls and ceilings which is unsightly and unsanitary. All machinery should be kept in a smooth running condition, because vibration means friction and friction means waste of power.

In judging the qualifications of a buttermaker, I would give fifty points out of a possible one hundred to his ability and willingness to care for, clean and preserve the creamery and its contents. In advising fellow buttermakers along these lines, I would say,—keep the creamery looking as near new as you can. Have your refrigerator room clean and dry. Have a place for everything in the line of tools, and then keep them there while not in actual use. Have a set of piping tools, and a soldering outfit, and learn how to use them, and you will find in the course of a year many calls for their use. Keep all dark corners clean and free from cobwebs, and remember that a tidy boiler and store room add to the general appearance. Have the ashes removed daily from the ashpit of the furnace, and kept there in a metal can until they can be removed. Empty salt barrels should not be used for this on account of the danger of fire. Do not darken your creamery windows in order to keep out the sun, because sunlight is the great annihilator of germs. The store room is the room from which the sun should be excluded as sunlight will cause the tubs and boxes to turn yellow, giving them a secondhand and shopworn look. Make the cleaning a part of your daily work and you will find that a few afternoons in the fall, painting the woodwork, and a few more in the spring on the pipes and boiler will be about all the extra time required. Utilize every spare moment, relacing a slack belt, fixing a leaky valve, packing the plunger of the pump, soldering a leaky utensil, washing the windows or repairing some other of the innumerable things which you now tolerate but which in some future busy time may require immediate attention. Keep the creamery clean for sanitary reasons; care for the machinery so that it will not be worn out prematurely; paint it to brighten and preserve it, and make it a place of which you may be proud.

(Applause.)

ANNOUNCEMENTS.

President Bruce:—All who care to renew their membership can do so at the noon recess when the treasurer will be present for that purpose.

Mr. Drew invites all members to go to his farm out on Shelburne Road to see his dairy. All desiring to go should so signify and carriages will be provided, leaving the Van Ness House at nine o'clock tomorrow morning.

The banquet tonight at the Van Ness will be called at seven fifteen.

Wednesday, January 10, 1906, 2 P. M.

President Bruce:—One word in regard to the renewing of your membership. It costs one dollar a year to belong to this Association or five dollars for life membership. The members are what make the Association. If New York should get a State appropriation their dairymen's meeting would soon be ahead of ours. We have the lead now, we want to keep it, and we want as many of you as can to renew your memberships, and those who never have been members, to become such. The members are entitled to the report and all the literature of the Association.

It is impossible for Prof. McKay to be here, but he has done the next best thing to being present,—he has sent his paper; and we have done the next best thing in getting Prof. Dean to read it to you.

Prof. Dean:—Mr. President, Ladies and Gentlemen: Your president and secretary have asked me to do what I never remember doing before at a Dairymen's Convention, namely, read another man's paper. However I shall do the best I can and trust I shall have your sympathy, for you can understand that it is a very difficult thing for a person to read another man's paper and make it interesting.

QUALITY AND QUANTITY OF BUTTER.

PROF. G. L. MCKAY, IOWA AGRICULTURAL COLLEGE, AMES, IOWA.

In discussing the quality and quantity of butter, I realize that I have two important ideas to deal with. Very few have any conception of the magnitude of the dairy industry of the United States. The value of the dairy product is about \$700,000,000. The total output of butter alone is nearly \$300,000,000, which is a little more than five percent of all our agricultural products. Butter considered as a crop is only exceeded in value by corn, wheat, hay, forage and cotton. More than half this amount is produced in seven states, while general agriculture is carried on in practically all states. The annual value of the dairy and egg production of my state is greater than that of all the gold and silver produced in the United States and Alaska. The consumption of butter is constantly on the increase. Ninety-four percent of our butter is consumed at home, leaving only 6 percent for export. With our constantly increasing population, it is only a matter of time, if the quality is kept up to the standard of extra, when we will be compelled to import to supply local demand, unless we greatly increase our output.

The greatest danger menacing the dairy industry today does not come from oleomargarine, but from the ranks of the creamerymen themselves, those who have placed quantity above quality. Deceit and fraud have never yet succeeded in building up an honest industry. Many in this audience no doubt remember the time when cheese, at Little Falls and Utica markets, sold for a premium of $\frac{1}{2}$ c to $\frac{3}{4}$ c per lb. above the Canadian cheese. To-day the Canadian cheese has a reputation in the English market that cannot be wrested from it as long as justice and right can control their output. This great change was brought about by some selfish scheming individual in the United States who placed on the market skimmed milk cheese and filled cheese and branded them as full cream cheese. This resulted in English merchants regarding all cheese from the United States with suspicion. This was a case where the innocent had to suffer through no fault of their own.

We find in the West and Central West that the whole system of butter making has been practically changed in the last four or five years. A few individuals have been seized with the desire to control the great dairy industry of the country. The result is that the quality of butter has deteriorated so much that it is seriously affecting the consumption of butter. There never has been a time when good finished products could be made out of poor, decomposed, raw materials. This is just as true in butter making as in any line of business. The sooner milk or cream is manufactured into butter or cheese, the better will be the quality of the finished product every time. The old saying "cleanliness is next to godliness" is as true and applicable to dairying as anything that I know of.

What gives butter its selling value? It is not the body or always the appearance, but it is flavor. This quality causes butter to sell higher than lard, tallow or any of the other fats.

Where cleanliness and care are observed, the Lord Almighty seems to have placed in milk all the necessary ingredients that go to make up good flavor in butter. Where cream is kept in an unsanitary place from three to six days as is sometimes done by farmers who ship to central plants, the flavor of the butter is seriously injured and cannot be fully reclaimed by any method. A great deal has been written about pasteurization of such cream. When scoring butter and observing it in different places, I have come to the conclusion that pasteurization is of very little benefit, if any, to old, stale, over-ripe cream. It is true that high heating will drive off some undesirable, volatile gases, but at the same time there is danger of producing other undesirable flavors in such old cream. I have a tub of butter in my laboratory that was sent in by one of our large central plants, to be inspected. The sender stated that they had lost thousands of dollars during the past summer owing to the peculiar metallic flavor the butter possessed. The writer stated that they had never been troubled with this kind of flavor until they begun pasteurizing old cream. I have information from another reliable party, who operated a central plant, confirming the above statement from his own experience. Some people have an erroneous idea that pasteurization is a panacea for all defects in cream. Pasteurization does not destroy the flavor that is already present in decomposed cream, but it does largely destroy the germs that produce this flavor. This reminds me of the colored man talking with his lawyer who was consulting him about the crime he had committed. The lawyer remarked: "Why they cannot put you in jail for that," but the colored man said: "My Lord, man, they got me; I am already in jail." When this flavor is already in the cream, it cannot be removed by pasteurization. Every loss that

is sustained in manufacturing this kind of cream is a great injury to the dairy business.

Denmark has made a great success with pasteurization because they have followed the method of pasteurizing good cream only. Their system is practically the whole milk system. They skim cream that contains a uniform amount of fat from day to day, pasteurize it when it is sweet, cool to a certain temperature and use a certain amount of starter. The result is a uniform product which is much desired by the English merchant. It is not so much the superiority in quality of the Danish butter as its uniformity that gives it the standing it has in the English market. They were beaten in the competition for the grand prize at the Paris Exposition by American butter made from raw cream. I believe that the reason why pasteurization is so much the vogue in Denmark is because the cows are kept in the barn almost the entire year. The result is that the majority of bacteria that get into their milk comes from the stable and belong to the putrefactive group. Pasteurization at such extreme high temperatures as they use destroys these germs before they produce serious defects. Then by using a good commercial starter, they are able to control the ripening of their cream and to produce a uniform article of butter.

The large, full milk farmer's cooperative creamery at Arlington, Iowa, had a maker, who is an exceedingly bright fellow. He offered prizes to the milk haulers who brought in the best grade of milk. The result was a rivalry of patrons on the different routes, which proved so beneficial to the creamery that this maker twice won the first place at St. Louis on his butter. He was finally induced to go to another creamery with a raise of \$25 per month. The maker who followed him was also able to keep up the same high quality of butter owing to the excellent milk furnished by these educated patrons. So we find the flavor of butter depends to a very large extent on the kind of milk or cream furnished by the patrons. Of course it is possible for a poor maker to spoil the best kind of milk and cream.

Judging from the number of letters I receive on the subject of churn overrun, the question of quantity seems to be the important one with creamerymen today. I have been severely censured, particularly in the East, for issuing a bulletin on the methods of controlling moisture in butter. I am a firm believer in the doctrine that every buttermaker should be thoroughly posted on all the matters pertaining to the butter business. A gun is a very useful article when rightly used, but in the hands of an ignorant or dishonest person, it becomes a menace to public welfare. So is the water content of butter. We have a number of large creameries that have carried the moisture business to

such an extreme that they have seriously injured the quality of their butter. The maker who gets 30 or 35 percent overrun is perpetrating a fraud on the public by selling a surplus of moisture for butter or more water than the law permits. Now, on the other hand, I do not advocate an extreme dry butter, as I believe that when it contains 14 or 15 percent water it will usually possess more flavor and show better color than will butter that contains but 7 or 8 percent. Butter is intended to spread on bread, so it must necessarily be plastic.

The Danish butter has been held up to the rest of the world as a model. We find, for a number of years back, that they have been constantly increasing the moisture content of their butter, so much so that the English merchants have complained lately about it. When I visited the English markets in 1901, I heard no complaint against the Danish butter in this particular point. In 1895 we find that the average water content of Danish butter was 13.70; in 1896 we notice a slight decrease, 13.68; in 1897, the average was 13.79, a slight increase and in 1898, it was 13.93. In 1899 we find it is 14.06 and in 1900 it was 14.09; 1902 it was 14.52. So we find that up to this date there has not been any complaint against Danish butter for excessive moisture content. All countries seem to have fixed about the same 16 percent standard for maximum water content. Now my advice to makers would be to endeavor to incorporate 14 or 14½ percent water. A 14 percent water content would give you an overrun of about 21 percent and allow you a little for waste. You can add about one-fifth of the water content of salt, or in other words, the water in butter will take up one-fifth of its bulk in a saturated solution. Butter containing fifteen percent water will stand 3 percent of salt in the finished product. Three percent salt suits the average American market well. This much salt can be incorporated without the butter being gritty or seeming over-salted to the taste. A medium high salted butter is less frequently attacked by mold, as salt is an antiseptic. It would seem from investigations that are being pursued by the Dairy Departments at Washington, D. C., and at the State College, at Ames, Iowa, that the high salting of butter is not desirable for storage purposes. Notwithstanding the fact that millions upon millions of dollars are invested annually in storage butter, there is practically no information available on the making of butter for storage purposes or the best temperatures for keeping it in cold storage. I believe from the work that we are pursuing, in connection with the Department of Agriculture of Washington, D. C., that we will be in a position to give out definite information on this subject before the next storage season. We found, from experiments carried on at Ames a few years ago, that butter

salted lightly had a tendency, after standing awhile in cold storage, to show a cheesy flavor while butter heavily salted showed a fishy flavor. These experiments were carried on where ice was used for refrigerating purposes, hence the temperatures were not as low as when artificial refrigeration was used. A few weeks ago I had the privilege of scoring some 200 samples of experimental butter. The different lots had been packed from the same churning, so any defects occurring were due to after-considerations. In every case where butter had been kept at 10 degrees below zero the light salted butter showed up about as fresh and sweet as the day it was made, while the high salted butter had a slight fishy flavor. When butter was kept at 10° below zero, it scored from 3 to 4 points higher than that kept as 32° above. In fact, in some cases we found a difference of six points.

The question of air spaces being left in packages is receiving special attention in our experiments and indications are that it has a serious bearing on the keeping quality of butter.

The factors that control the water content of butter are temperature of churning, thickness of cream, amount of cream churned, condition of churning and working of butter in water. A thick cream will give a higher percent of overrun than a thin cream under normal conditions; or in other words, a cream containing 40 to 45 percent fat will give you a larger overrun than will a 20 or 25 percent cream, unless you use some other method of changing the natural conditions of the latter churning. The reason why a thick cream will give you a greater overrun is undoubtedly due to the formation of the butter granules. In a thick cream the granules as they gather are irregular in size and somewhat oblong in shape, and the fat globules are not driven together so firmly as in the churning of a thin cream. It has been thoroughly demonstrated in the large creameries, where a detailed record is kept of all work, that under normal conditions a churn filled two-thirds full with cream will give a much higher percent of overrun than one filled one-third full. A large churning is not influenced by atmospheric conditions as much as a smaller churning is, and the butter gathers in a more flocculent condition, that is to say as I have just remarked, the fat globules are not driven together so firmly as in a small churning. When over 16 percent of water is incorporated in butter it is usually accomplished at the expense of its body, for when butter takes up an excessive amount of water it must become somewhat soft or pasty in character. It has been known for years that some farm or dairy butter contained so much water that it affected its color, giving it a light, pale, lifeless color. Excessive churning, or churning in it large lumps or rolls, will give you a high per-

cent of water. It is unnecessary for me to spend any time here in discussing the different fat contents of butter. Taking butter as a whole there is more moisture incorporated in summer months than in winter months, as butter has a lower melting point at this period. In the winter months, when butter contains more stearine, it will stand much more working to bring about the same condition as in the summer. To demonstrate this more fully, I will give you a crude illustration. The majority of you are familiar with putty. You take a piece of putty that is somewhat dry and you invariably use oil to soften it. When you first crush it in the oil, very little change takes place. After a time, however, the putty assumes a pasty condition and takes up the oil very quickly. If, however, you continue to work it in the oil, the putty becomes short and brittle in the grain. Butter acts very much the same with water as the putty does with oil. The method usually used by those creameries that have incorporated an abnormal amount of water is as follows: They churn at a low enough temperature to get an exhaustive churning, and gather the butter in large granules. They wash these very slightly and then place enough water on them to make them float, or about 50 or 60 gallons to a churning. The rolls are then placed in slow gear and the butter is worked the same as when working in the salt. The number of revolutions they give the churn will depend on the amount of water they wish to incorporate in the butter. In the winter months, they usually give it about 20 revolutions and in the summer, 8 or 10. This of course depends entirely on the condition of butter or the temperature of cream when churned. Prof. Gray, now connected with our institution and formerly chemist for the big Continental Creamery Co., tells me that so completely did one of their makers have this system under his control, that he did not vary the moisture content of his butter over 1 percent during an entire month when Mr. Gray made daily chemical analysis of the butter.

When you first begin to work butter in water, the moisture content is expelled from the butter, but after it softens up, it takes up water very rapidly; hence the greater number of revolutions you give the churn at this period, the higher the water content will be. Of course excessive churning will give you the same result, but the water content cannot be kept as uniform as by the other method. To get uniform results in churning, cream should be cooled at least two hours—and better four—before churning. After the butter has been worked the desired number of revolutions, the water is removed and the butter is salted at the rate of about $7\frac{1}{2}$ lbs. salt to every 100 lbs. of butter fat. This leaves about $3\frac{1}{2}$ percent salt in the finished product. It takes about 20 revolutions with the Disbrow and

15 with the Victor churn to incorporate the salt. When extreme fancy butter is desired, it is better to avoid the excessive churning or working the butter in water. Such butter should be churned in middling large granules, gathered in about 30 minutes, not hard or very soft but pliable to the hand, the buttermilk removed as quickly as possible and washed with water at about the same temperature as the butter, and salted as soon as the wash water is removed, while the butter is yet soft. It is the water in the butter which dissolves the salt; hence if it is quickly mixed with the butter when it is in a moist condition, less working will be required to get the salt thoroughly dissolved. Many creamerymen are apt in the winter months to permit the butter to drain too dry and to become somewhat chilled before applying the salt. This invariably means extra working or mottled butter, and a low percent of moisture. If one creamery gets 5 percent more overrun than another creamery or a gain of 5 lbs. on every 100 lbs. of butter, it naturally can pay more for butter fat. Some of the best buttermakers in our State, men who are getting one and a half or two cents per pound premium on their butter, are the makers who are thoroughly posted on this moisture question, who always get a good overrun and do not go to either extreme.

DISCUSSION.

Prof. Dean:—We have been investigating this matter of overrun in Canada. There is a tendency on the part of Canadian buttermakers to just this fault which Prof. McKay warns you against. Undoubtedly in the winter time the butter is too dry; and it would be well to incorporate 12, 13 or even 14 percent of moisture into it and it would be better butter as a consequence. But we have no practicable way at the present time whereby the maker may with surety determine the moisture content of the butter. It is a difficult matter even for the chemist accurately to determine the moisture in the butter. The danger is, as I have said to our buttermakers, that the thing will be over done. The man who makes a butter carrying over 16 percent is liable to heavy fine, whether the product is sold in the markets of Great Britain or of the United States and the goods are liable to be confiscated. I am glad that Prof. McKay sounded that note of warning about overloading butter with moisture, or as they say in the old country, waterlogging it.

Mr. Jackson:—Does not butter that contains an abnormal proportion of moisture sell at a less price proportioned to its extra water content?

Prof. Dean:—I am unable to answer that question because I do not know your market conditions. You probably have somebody in the audience that can answer the question.

Pres. Bruce:—That seems to be a sticker.

A Member:—Is this moisture calculated on the butter fat or on the churn test?

Prof. Dean:—I do not know Prof. McKay's view of that point, but when we speak of overrun, we understand the amount of butter made in excess of the fat in the milk or cream. To illustrate: Suppose we have delivered at the creamery 100 pounds of fat in the milk or cream, and make from it 115 pounds of butter. We say the overrun or churn gain is fifteen percent.

Prof. Decker:—I think that Prof. McKay's idea is the same. He says it is possible to make a 21 percent overrun; and then he says, butter carrying 14 or 14½ percent of water, 3 percent of salt and a little casein, or a total of 18 percent of water and other substances will contain 82 percent of fat and there may be made about 121 or 122 pounds of butter from 100 pounds of fat.

Pres. Bruce:—Ladies and Gentlemen: I take great pleasure in introducing our next speaker, Prof. J. W. Decker of the Ohio State University, Columbus, Ohio.

THE LAW, THE PENALTY, THE BUTTERMAKER.

JOHN W. DECKER, PROFESSOR OF DAIRYING, OHIO STATE
UNIVERSITY, COLUMBUS, OHIO.

Law is that which is set or fixed—certain principles which are fixed because they are right or true; our deviation therefrom is a violation of law; and the violator is a sinner.

A penalty is a fine imposed upon person or property for the violation of law. Law knows no excuses, but invariably exacts its penalties for infraction of the law. Ignorance is no excuse; the law acts just the same and imposes the penalty upon the sinner.

There are certain laws governing the production of good butter. If the sinner of a buttermaker does not know these laws, it is useless to offer excuses, for the penalty of inferior or bad butter is the penalty that is sure to be applied. It is the business of the buttermaker first to know these laws and second to act therein. The penalty is alike for the buttermaker who does not know the law and for the one who knows it but does not observe it. In either case he is a lawless buttermaker.

The laws on certain subjects are numerous, working in a complex way. It is necessary that they be codified and annotated so that one may readily know when the law applies in the case. Our Experiment stations and Dairy schools have been codifying and annotating these laws—they haven't completed the job yet; but we may know better now than we used to know what these laws are and their relations to each other. It is my purpose here to point out in a general way what some of these laws are.

Butter is a commercial article made principally from cow's milk. It consists of fat, water, salt and some casein, milk, sugar, etc. Good butter has a pleasing taste and aroma, is close of texture and the grain, when broken, is not greasy but resembles steel. It is also firm to the touch or has, as we term it, good body.

How do we observe the laws of butter making to get such a product? It will be necessary for us to go back to the milk, or even farther than that, to the feed that the cow eats.

It is well known that strong flavored foods such as turnips, garlic, rape, etc. when fed to cows shortly before milking will convey their characteristic odors to the milk. Milk when drawn from the udder may absorb odors, especially when it is warm. Bacteria may fall into the milk, the growth of which may cause decomposition products which have bad flavors. An infraction of these laws at any point will bring down the penalty on the head of the sinner of a buttermaker.

An average analysis of milk would be as follows:

Milk	{	<u>Water 87%</u>	{	Solids not fat	Ash	a7%
				Casein	2.7%	
	{	Solids 13%		Albumin	0.7%	
				Sugar	5%	
				Fat 3.9		

The solids not fat dissolved and held in suspension in the water make the milk serum. The fat in the form of minute globules is held in emulsion in this serum.

Cream is a smaller portion of the milk serum into which the fat globules have been crowded. If they are crowded very close together it is termed a thick or heavy cream—though actually lighter in weight. If not crowded close it is a thin or light bodied cream. The fat of milk is not one fat but a mixture of a number of fats, palmatin, myristin, olein, stearin, butyryn, caproin, caprin, etc. The character of these fats in slightly varying proportions affects the character of the milk fat or butter fat. Palmatin melts at 144° F. and myristin at 129° F., while olein is liquid at ordinary temperatures. The melting point of the combined fats varies from 87° to 92° F. and may in certain cases show a yet greater variation. By melting point is meant its entire liquidity, not that long range of temperature through which it is in a plastic, sticky condition. At a point between 50° and 55° F. it becomes solid. It is generally conceded that feed does not change the percent of fat in the milk, but it certainly does affect the composition of this fat. Cottonseed meal raises the melting and hardening points of butter fat while oil meal and gluten feeds lower them. The milk of stripper cows carries relatively more of the harder fats than that given by new milch cows.

Butyryn and some of the minor fats are soluble and their fatty acids are volatile, and are peculiar to butter fat. They undoubtedly affect the rich aroma of butter. Butyric acid, closely allied chemically to butyryn, has a rancid odor. Oleomargarine

which does not contain these lighter oils does not get rancid. When oleo is heated it has a lard flavor, but when good butter is heated it has the rich odor peculiar to good butter. This is possibly due to these oils being driven off. Oleo manufacturers use all the methods of ripening known to the buttermaker to produce flavor, but there is a great gulf between the two that cannot be bridged by the use of starters. Good milk or cream kept for several days can not by any or all the arts of pasteurizing and ripening with pure cultures produce that rich nutty aroma so much desired. This lies, I believe, largely in the character of the fat, and may make a difference of at least six or seven percent in the value of the product.

Renovated butter stands in the same class with oleo, for the heating employed in the renovating process tends to drive off the volatile substances which seem to give butter fat its quality.

Now let us consider the churning of the fat. The plasticity of the fat is an important factor. The process of churning is a process of bumping the fat globules together. If they are very plastic they unite quickly. If we get below a point of plasticity they will refuse to unite. The red hot horse shoe that the old ladies used to drop into the churn to drive out the witches raised the temperature to the point of plasticity. The patent churn that brings butter in three to five minutes requires plastic fat to accomplish this result.

But there is another important factor in churning. The fat globules must be close together but not too close. Thin cream requires a comparatively high temperature to bring butter. The fat globules are so far apart that the bumping does not stick them together readily. Even when high temperatures are used the smaller globules are left behind when the large ones are gathered and the considerable quantity of buttermilk is rich in fat. If the fat globules in the cream are close together they bump more readily, the smaller ones have less chance of escape, and the smaller volume of buttermilk is relatively poor in fat. If however the cream contains more than 40 percent of fat the globules are so close together that after a little bumping the irregular masses of fat refuse to pass and the cream revolves with the churn. It is then necessary to add enough water to separate the particles in order to let them pass. Cream for churning should contain about 35 percent of fat in order to miss this point of sticking together,—of being too thick on the one hand, and on the other of too much loss of fat if it is too thin.

A buttermaker churns three or four hours at 54° F.—the summer temperature, before the butter comes. He raises it three degrees, following a suggestion from an expert, and it comes in forty minutes. The buttermaker had forgotten that

the fat from stripper cows' milk is harder, and he paid the penalty of three extra hours work.

I cannot cover the whole law covering the subject of buttermaking but my purpose is to suggest that the buttermaker pays for ignorance or carelessness (lawlessness), in terms of his own life blood.

Good flavor in butter is largely due to decomposition products resulting from the fermentation induced by the lactic acid bacteria in the milk serum. This has been so well emphasized of late years that I will simply call attention to some phases of the subject. In the first place it is necessary to be sure that the weed seeds are destroyed in our field; that in other words it is necessary to pasteurize and then to sow good seed, that is to say, pure cultures. Then the buttermaker must carry the fermentation just far enough to get the highest flavor. He must be well up on the law in this respect, or the sinner will have to pay the penalty. After the buttermilk has been drawn, the excess of casein must be washed out. Dr. VanSlyke has shown that mottled butter is due to the action of salt on this casein. The water should be pure water, clean and free from bacteria. Water from shallow wells is likely to have bacteria from the surface of the ground, which will spoil all the previous good work of the buttermaker. Water from deep wells is usually sterile, but not always so, especially in lime stone rock. I have in mind a case that occurred recently in Ohio. A fine building and equipment had been provided. A well was driven down through clay and limestone rock to a depth of 133 feet. The butter appeared nice at first, but after standing developed a rank flavor. Commission men said that it was magnesia in the water. Chemical analysis showed that water from a well that had previously been used with excellent results had twice as much magnesia as this well. Investigation determined the fact that the water was contaminated with bacteria, that it carried 35,000 bacteria per cubic centimeter of water which when put into sterile milk produced the same rank flavor that developed in the butter. Further investigation convinced us that the sewage from a town of 6,000 inhabitants ran into a river, that this river ran up against a ledge of rock which dipped down under the town and then came to the surface again on the other side. The sewage flowed by gravity four or five miles under the town and was pumped up by the creamery pump and spoiled the butter. They now heat the water to 212° F. and cool it again before using it in washing the butter, and they are having no more trouble. Moral:—Don't waste effort in making good butter and then wash it with bad water. The sinner will surely pay the price.

During Prof. Decker's talk, he passed among the audience in test tubes and spoons, samples of melted first class butter, melted oleomargarine and melted renovated butter.

DISCUSSION.

A Member:—What temperature would you recommend for separating milk?

Prof. Decker:—150° F. is better than 90°; but as separators are usually operated in factories, 85° to 90° F. It is better with our small separators to separate the milk just as soon as possible after it is drawn from the cow's udder. Milk separates better at 90° to 95° F. than at lower temperatures because the fat flows easier. As you lower the temperature of the milk serum it is harder for the fat globules to move through it. If you warm it up, the milk serum is more plastic and the fat globules will pass through easier. If the milk is flowing rapidly through the separator at 60° to 70° F. the fat globules are impeded in the passage and do not get all separated. The operator has the penalty in terms of the butter fat that he loses.

A Member:—At what temperature would you churn?

Prof. Decker:—To answer this question aright one needs to understand the complexity of the laws which are called into action. It depends upon the composition of the butter fat, on the relative proportion of the nine different oils. It may vary from as low as 50° F. to as high as 60° F. according to circumstances as indicated in the text of my address.

A Member:—Would you churn at 62°?

Prof. Decker:—Possibly, particularly if the cream is thin. Don't get cream too thin. Thick separator cream will churn better than gravity cream, because the latter carries but 15 to 25 percent of fat. It is a thin cream. If cream is so thin that you have to churn at a high temperature the butter comes very soft and you are liable to injure its grain; it looks greasy and mussy and it sells for less. You pay the penalty of your lack of knowledge. To churn under the best conditions cream should carry 35 percent fat; and then you can churn at a lower temperature and get a harder and better butter which the butter-milk will leave more completely. And you have more skimmilk too. I take it that you are sending a good deal of relatively thin cream to the gathered cream factories. Perhaps you think you are going to get a little more money if you have a considerable body of thin cream. This is not the fact. There are three reasons why thin cream is not as desirable. It contains more

milk serum in which undesirable fermentations may occur which the buttermaker has to overcome by the use of a heavy starter, thus diluting a cream already too dilute; a larger loss occurs in the buttermilk and there is less skimmilk to keep on the farm. If, on the contrary, you send a 40 percent cream, the buttermaker has less serum to handle, fewer obstacles to overcome, meets with less fat losses in the buttermilk, and the farmer has more skimmilk to feed.

A Member:—Can a separator skim a 40 percent cream and do clean work?

Prof. Decker:—Yes, if it is a good one. I doubt whether some of the cheap makes will do so. You cannot set your machine so that it will take just the same percent of fat continuously. Four factors affect the density of the cream, the inflow, the temperature, the speed and the test of the milk. If you do not keep the can full and the pressure drops down a little, you will have a little different regulation between the amount of cream and skimmilk. The temperature, the speed of the machine and the test of the milk will affect the cream. Perhaps some of you have been having milk tested long enough to know that it varies in fat from one milking to another, and from one day to another,—and these variations are reflected in the quality of the cream.

A Member:—Would you recommend 50 or 60 percent cream?

Prof. Decker:—I would rather keep it between 40 and 50 percent.

A Member:—Do not farmers often lose because of faulty methods of testing heavy, thick cream?

Prof. Decker:—Undoubtedly. It is harder to sample cream than to sample milk. The fat globules are closer together and it is harder to distribute them evenly. Now, in gathering their samples in the West they do it in this way,—they pour the cream from one vessel to the other so as to mix it evenly and then use a sampling tube like the McKay tube (showing it) and run the sample into an ounce or two-ounce bottle, filling it full lest it churn on the road. The little butter granules in a churned sample are hard to work back into the cream. The sample comes into the factory and is warmed up so it will flow easier; and is tested by *weighing into the test bottle*. Instead of using composite samples, they test it every day now,—it gives better satisfaction. There is no reason why a composite sample should not give accurate results if proper care is taken, but it seems to prove more satisfactory to have the samples tested daily. A factory in which our instructor in buttermaking has worked made 7,000

pounds of butter a day and handled daily about 400 samples of cream. It was a large factory,—two men at the testing.

A Member:—Does he who brings thin cream realize less profit than he who brings rich cream?

Prof. Decker:—That is the fact of the case. The thick cream may be churned to better advantage than the thin cream. There is less milk serum to get rotten and cause trouble and a larger starter may be used without diluting the cream to below 30 percent fat.

A Member:—The man who brings the thin cream, of course, gets a lower test than he who brings the thick cream. But he gets the same price per pound for his butter fat, does he not?

Prof. Decker:—No. He delivers just as many pounds of butter fat, whether it is in thin or thick cream. But—and here is the point—if this fat is contained by a thick cream, the globules are crowded together in a small amount of milk serum, and he gets, perhaps, a cent more a pound for the butter fat in the thick cream, because the buttermaker can make a better grade of butter, which sells at a higher price because of its improved quality due to the thickness of the cream.

A Member:—Do you recommend using a starter in cream gathered once in two or three days?

Prof. Decker:—Yes. It is necessary to use a starter to control the fermentation. If the cream is somewhat acid and pasteurization is resorted to, a 40 percent cream with relatively little serum will handle better than a 20 percent one carrying relatively much serum. If the acidity is too high at the temperature at which it is pasteurized a thick curd will often form which appears in the butter in the form of white specks. To obviate this viscogen (sucrate of lime or lime water and cane sugar) is used to neutralize the acid.

A Member:—What temperature of wash water would you use compared with the temperature of the cream in churning?

Prof. Decker:—If one starts at 53° and the butter would break at 55°, use wash water at 60°.

Same Member:—In a room temperature of between 60° and 65°, I find it hard to handle butter churned below 60°.

Prof. Decker:—That is true. It depends upon other conditions. If you are churning in the winter time and have harder fats, and your room gets colder,—you would use a warmer wash water perhaps than you would in the summer time when you have got soft fats and when your temperature would be likely to get away from you and make a soft butter and injure the grain.

A Member:—Can you get as good flavor from good separator cream pasteurized immediately as you can from the raw separator cream?

Prof. Decker:—Perhaps yes,—and perhaps no. Prepare the field and then sow the good seed and you are sure of the kind of a crop you are getting. That is the experience of Denmark. They are pasteurizing uniformly in Denmark. It makes a uniform quality of their butter that goes into England.

There is a point where Prof. Dean and I do not agree. The fact of it is that while there is a small market for sweet cream butter, the market demand is for ripened cream butter.

A Member:—How is the dairyman to ascertain just the right percent of acid in the cream for churning?

Prof. Decker:—Well, you have got to know your business or you will fall down. That is just where cooperative dairies beat the private dairyman. This is an age of specialization; you turn over your cream to a man that has the equipment, the best machinery for doing it, makes it in larger quantities and it brings more money. It is his business to make the butter and he doesn't do anything else perhaps. But it is his business to make good butter. It stands to reason that he ought to know how better than the private dairyman. It sets the farmer free from the making of butter. He can handle more cows and handle them better,—in fact the farmer can then make a specialty of his end of it.

A Member:—Is there an instrument made purposely for testing the acidity of cream?

Prof. Decker:—Yes. The acidometer is used in the West.

A Member:—There is a deal of difference in the cleanliness of milking, and a difference in the creamerymen. One separator man tells me that he "can separate anything but the milking stool, no matter how much dirt or carelessness there has been in milking."

Prof. Decker:—Separate any kind of milk, milk that has dirt in it, and get good cream?

A Member:—That is what he said.

Prof. Decker:—He can't do it.

A Member:—Can you by pasteurizing skimmilk avoid the transmission of tuberculosis to calves and pigs?

Prof. Decker:—Yes, providing you pasteurize at a high enough temperature. In Denmark 180° or 190° F. is applied to all skimmilk at the creameries. The distribution of tuberculosis among the calves and swine of Denmark was beginning to be frightful. The Danish Government stepped in and prevented the further spread of tuberculosis in that way.

A Member:—What is the acidity of cream just as it begins to thicken?

Prof. Decker:—The acidity of the milk serum is between 7-10 and 8-10 percent;—where you have cream that is 40 percent fat you haven't as much serum. You have got to measure the acidity in the serum rather than in the whole cream.

A Member:—Would you advise the average dairy butter-maker to pasteurize his cream?

Prof. Decker:—Perhaps not. I think he would perhaps be surer of his results if he pasteurized and used a starter; but the average dairy buttermaker has got the conditions under his control a good deal better than the creamery buttermaker has, because the latter has fifty or one hundred different men that are sending him stuff; and one of those men being delinquent might cause a lot of trouble. You can control things on your own farm though sometimes they may fool you. The weeds might get in, blow in some way when you didn't know it; then you would have trouble.

President Bruce:—Mr. W. N. Gilfillan of South Ryegate, a man who has had to do with creameries, and who knows all about the patrons, being a patron himself, and a practical farmer besides, will tell us this afternoon how we can bring about co-operation between the Dairymen and the Creamerymen. I take great pleasure in introducing Mr. Gilfillan to you.

HOW WE CAN BRING ABOUT COOPERATION OF THE DAIRYMEN WITH THE CREAMERYMEN.

W. N. GILFILLAN, SOUTH RYEGATE, VT.

I cannot tell you much you do not know already; but if I can say a word that will help in the great matter of cooperation in dairying I shall be glad to do it. Thirty years or more ago when the Board of Agriculture came to Ryegate, which by the way was settled largely by Scotchmen, and began to tell us of creameries and cooperative dairying, some of our people were slow to believe it. The Board was about the first to suggest to us that cooperation in dairying had advantages over private dairying, and our people were decidedly skeptical. I doubt not that the Board came to the conclusion that Ryegate would be one of the last towns to accept and adopt cooperative dairying; and, yet strange to say, 12 years ago there was a sudden overturn and four creameries were organized and set to work in Ryegate. Well, of course, we were near neighbors. There was some competition. The Scotchman is anxious to get all that beongs to him, you know, and we had quite a time of it. In fact, the conditions were not what we could wish,—sometimes we cooperated and sometimes we didn't. As a gentleman in an adjoining town where they started a creamery said when asked how they were getting along, "half of them are mad all the time."

We have been helped in our work, however. We have succeeded in our dairying and this success has come about, in part at least, because of this help all along the line. The board of Agriculture aided. We grew to like the members of the Board, to have them come to us as often as possible; and they all said that they liked to come. The cattle commission was of assistance. We gladly welcomed the commission. We took the matter of tuberculosis in hand vigorously in our town, and there are more cows tested in Ryegate than in any other town of Vermont except Randolph. And we are glad to know that we had very little of the trouble. The Experiment Station helped. We had to call upon the Experiment Station to help us in doing our work from time to time and it never failed us. We have sent samples over here to get help in testing. We have had some of their young men

come right there and ferret out our troubles. And we especially thank Professor Hills who has been ready to help us in every direction. And then another helpful influence has been the Vermont Dairymen's Association. And now in order to get this into compact form you will pardon me if I use a manuscript.

We often hear of the independent farmer and we have a great respect for him. He had a large part in making these United States possible. He stood shoulder to shoulder with his fellowmen in fighting for home and freedom. Never was more successful cooperation. Yet, when asked to place a large share of his business and income into the charge of others, it is not strange that he is slow to do so; and hence the problem how to bring about cooperation of the Dairymen with the Creamerymen.

Now the greatest obstacle to cooperation in the dairy business is the "ways that are dark and the tricks that are vain" of the sharp manager and the dishonest creameryman.

In solving this problem there are three factors of prime importance.

1. The plant and its management.
2. The creameryman.
3. The dairyman.

THE PLANT AND ITS MANAGEMENT.

The building should be centrally located with first-class drainage and good water. It should be well lighted, pleasant, attractive and as conveniently arranged as possible. A good woodshed should be provided. A creameryman is not made happy by being obliged to dig the fuel from under snow banks or out of the mud. In short, the plant should be first-class in every respect for doing business to advantage.

A good plant encourages the creameryman to do good work and he soon takes a pride in keeping it neat and tidy. When the independent dairyman comes in he notes at once that things look well and that the plant is made to do good work. This is the first step towards cooperation. They have something that pleases both parties.

The management is of great importance in securing cooperation and making a success of the business. Everything may be complete yet a total failure result if the management is at fault. There should be three or five directors men of ability, tact and common sense, men who do not talk too much, men who can decide questions and stand by their decisions. They should meet at least once each month and decide on the price to pay for butter, full information having been placed before them by the Secretary and Treasurer.

They should consider complaints and all business of importance and instruct the manager what to do. The manager should be a man that commands respect and confidence. Aside from general duties in business management, it is necessary sometimes for him to criticise creamerymen and dairymen. It is of great importance that this be done discreetly. "A word fitly spoken how good it is." It may help or hurt. It will have much to do with bringing about desired cooperation or in preventing it. He should not be too much of a boss. A boss is of secondary importance in cooperation. He should not keep nagging, but insist at proper times on having the right thing done. In short, divide responsibility, but centralize management. Let the Directors direct and care for everybody.

THE CREAMERYMAN.

What should be the creameryman's qualifications? He should be strictly honest and know his business. He should be a gentleman every time and everywhere,—an all round man,—a better man, if possible, than the manager or directors and a near relative of Solomon and Job. He should be a graduate of the Vermont Dairy School (if we have one); but woe to him if he thinks that is all that is necessary in order to know his business. The Dairy School is a great help in learning to do work carefully and exactly; but its training is special and needs the supplement of practical work. Let him work with a good man who knows how and who stands high in the school of experience. If he changes location after a few years, it is an advantage to him. It is easier to correct mistakes. All men make mistakes; a new location gives a chance to begin over again. He knows more than at first, is worth more to everybody, himself included.

We would not have him do the figuring. Divide the responsibility as much as possible. We would make him assistant manager. He knows better than any other person just what is needed in the plant and he should be allowed to use his own judgment in helping to make things right in the plant and with the dairymen. Trust him if he is worthy of it. You will soon know it. If he is not worthy, get a new man quick. He should suggest at once in all important matters to the manager just what is needed. This saves time and expense and frees him from responsibility in that direction. Give him a good plant. Treat him like a gentleman. He deserves it. Not many men in business have so much to try their good nature. I feel like Josh Billings when the schoolmaster passed him on the street; he removed his hat as a sign of respect to a man who had troubles that the general public know not of. Pay him well. Make him

happy and you have solved a large part of the problem of co-operation.

Ninety-five percent of creamerymen who are adapted to their business will go more than half way to help out the dairyman. (Note: Perhaps you would like to know who our creameryman is? We think he is a good example of cooperation carefully applied. His name is Hatt.)

THE DAIRYMAN.

The third factor in the problem of cooperation, the dairyman, if he is the independent farmer spoken of, is a very large part of the problem. It is often necessary to convince the dairyman that it is to his advantage to cooperate in the dairy business. Some are open to conviction. Others are like the Scotchman,—ready to be convinced but would like to see the man who could do it.

The Board of Agriculture has done good work by showing the need and value of cooperation. A great help in this direction is a good agricultural journal, read and its ideas thoroughly applied. The Experiment station has often helped us in many ways, and "Thus says the Station" has settled some of our troubles in trying to find better ways. No one knows it all. No one can learn it all. It will save time and expense to secure aid from every available source. This is one of the advantages of cooperation.

It is not strange that the dairyman is slow to place a large share of his business in the management of others; hence he is entitled to courteous treatment even if he is hard to convince, slow to learn better ways and often tricky. He is entitled to correct and careful work when he brings his product to the creamery.

He should know just what his weights and tests are every time and these should not be meddled with upon any condition. It is a fact that figures are sometimes juggled with and thereby a higher price is paid for butter fat and a false reputation is built up. This causes trouble and ought to do so. Strange as it may seem, this appears in neighboring creameries. Patrons not knowing the facts are grieved because they are not paid so high sounding prices when, as a matter of fact, they are actually receiving more money for their product at the lower price per pound of butter fat.

A certain creamery on the east side of the State some years ago paid two or three cents more for fat than we did. Figured on the churn we paid 58-100 more than they did. How is this done? I hold in my hand a statement which is a model in some

directions for it tells it all. It gives pounds of milk and test of 4.45 and surplus of 22 7-10. The actual test given by the creameryman was 5.40 or 95-100 more. The change was made by the manager who does the figuring. These methods should be stamped out by the strong hand of the law applied without fear or favor, for they place a premium on sharp practices and discount honest work. Cooperation can never be successfully secured in this way and under such circumstances the dairyman is justified in kicking to the extent of his ability. A great help in securing the good will and cooperation of the dairyman is to treat him as a partner in the business. Let him know all about it. Keep the records in simple form, post a public statement of each month's business or let it appear on his statement. In short, treat him like a gentleman whether he is one or not. You will help make him one. Insist on his bringing a first class product to the creamery. Show him in every possible way that you have his best interests at stake, and your problem of cooperation between creameryman and dairyman is well on the road to solution.

The President would say, "Give every man a square deal." We would add,—“Get together and do as you would be done by.” (Applause.)

Note 1. Testing milk or cream of patron of adjoining creameries should never be done without full consent of the managers of the same, a correct sample being furnished both creamerymen. (Disputed tests are best settled by the Experiment Station at the expense of the creamery.)

Note 2. Patrons should be loyal to their own creamery when sure that they are getting honest treatment even though they do not get so much money. Help your friends and neighbors and you will help yourself. Some things are worth more than dollars.

DISCUSSION.

A Member:—Was the creamery where the test was changed by the manager a cooperative or proprietary one?

Mr. Gilfillan:—It was a cooperative creamery. The management was running two creameries and won a reputation for paying large prices.

I mentioned the fact that we paid fifty-eight one hundredths more for our butter than their creamery. The report of that creamery has never been issued—save once. It showed a surplus of 30 percent for the whole year. That tells how the thing was

done,—and yet it is said that “where ignorance is bliss ’tis folly to be wise.” The test is cut for the purpose of making a bigger showing in monthly returns. I have understood there were creameries where that was done by mutual consent; but so far as I know, that has not been done by mutual consent in our part of the State.

Prof. Decker :—We have this same trouble with over reading or under reading. If a creamery wants to get a patron away from its competitor, it will over read it.

A Member :—Could the buttermaker be prevented from over reading or under reading by legislation?

Mr. Gilfillan :—I doubt it.

ELECTION OF OFFICERS.

Pres. Bruce:—Shall we now proceed to the election of the officers? It is customary to nominate from the floor. The first officer to be elected is a president to serve you one year.

Mr. J. J. Jackson of Morrisville was nominated by Mr. C. F. Smith, and the nomination seconded by Mr. B. A. Hatt and others. Mr. Dana H. Morse of Randolph was nominated by Hon. Homer W. Vail, and the nomination was seconded by Messrs. C. A. Bump, Geo. Aitken, Cassius Peck and others. The President appointed Messrs. Smith and Vail tellers, who having collected and counted the ballots reported the results to the President who announced the result as follows:

Total number of votes cast 75. Necessary for a choice 38. Dana H. Morse 42—and elected.

On motion of Mr. Jackson seconded by Mr. Smith the choice was made a unanimous one. The tellers were appointed to conduct the newly elected president to the chair who said:

President Morse:—Gentlemen of the Vermont Dairymen's Association: I came to this beautiful city with no aspirations, no hopes, no expectations and even without desire to be placed in any office within the gift of this Association. So, in placing me in this position, at the head of an organization of which the State is so justly proud, one which is doing and has done so much to elevate the cause of the Vermont farmer not only in the line of dairying but in every other line, you do me a great honor, and I beg you to believe that the three words which I now speak are from my heart depths,—I thank you. I am not before you my friends to make a long list of promises as to what I can or will accomplish. I am here simply to say this one thing,—that I give you the benefit of my best judgment and my best efforts. That is all I can do. And what do I expect and may I expect in return? The hearty cooperation of every member! And when my brother Jackson, a man whom I have long known and esteemed, moved that my election be made unanimous, my heart leaped with joy at such magnanimity. Gentlemen, I thank you and while I assume and accept the duties of the office and will discharge them to the best of my ability, I not only appreciate the

honor but also the added responsibility; and I will try, my friends, as I said in the first place, to do the best I can.

One more thought: While this Association has done much to elevate dairying, as the scoring of butter and cheese here to-day indicates; while much has been done in that line and in many others, there is one thing that I want to suggest which it seems to me has been neglected, and that is the other end of the business,—the marketing of our products. Make as good butter as you will; make as good cheese as you will, raise as good stuff as you can upon your farms, and what is the result? You are placing your goods in the hands of somebody else to make the real profit. Now the man who can tell us of some way that we can put our goods upon the market, ask a price like other dealers and receive that price and control our own business, not in an exorbitant way, but in a fair way and save to us the product of our labor, will be a benefactor of the farmers of the State of Vermont. I thank you for your attention.

Proceeding to further business the following gentlemen were nominated and elected by ballot to the offices named:

First vice-president, Mr. B. A. Hatt of Ryegate. Nominated by Mr. H. L. Lyster.

Second vice-president, Mr. Geo. Dinsmore of St. Albans Bay. Nominated by Hon. J. K. Curtis; seconded by Hon. Geo. Aitken.

Secretary, Mr. Fred L. Davis of North Pomfret. Nominated by Hon. Geo. Aitken and seconded by many voices.

Treasurer, Mr. M. A. Adams of Derby. Nominated by Mr. Northrop.

Auditor, Mr. C. F. Smith of Morrisville.

The Secretary elect following his election said:

I feel very highly honored in receiving this election as Secretary of the Vermont Dairymen's Association for the eighth time. I had thought perhaps it was time to change, to let someone else have it and I think I have said during the past summer that I thought it would be best for me not to serve another term; but nearly every member here has approached me and seemed anxious that I should hold the office another year, and I have consented. I will do the best I can and I thank you very much.

Mr. Hitchcock:—In regard to the distribution of the butter fund. It certainly seems to me, (as it did last year, when the proposition I shall now advance was unfavorably met), that the standard should be raised. As I understand it, the method of

distribution is to divide the entire premium money pro rata amongst those whose butter scores over 90. It seems to me that this Association should raise that standard. If I remember correctly every sample brought here this year has scored 90 points. In my judgment the standard should be at least 92 points.

Mr. Smith of Fletcher:—I believe the gentleman is right and that the standard should be raised at least two points. If my butter does not score more than 92 it is not entitled to a premium.

Mr. Hitchcock:—I move that for the distribution of the butter fund the standard of butter scoring be raised from 90 to 92 points.

Mr. Bruce:—I second the motion.

Mr. Bronson:—As I understand it the Association owns the butter once it is brought here. While I believe in raising the standard I would amend the motion so that butter that fails to score 92 and thus gets no pro rata may be returned to the original owners. Otherwise a man who sent butter here which failed to score up to 92 would be obliged to give it to the Association and get nothing in return.

Mr. Hitchcock:—I hope that that amendment will not prevail. It will simply mean that the butter fund will be reduced so much. No man is under obligation to send butter here if he doesn't want to; no wrong is done; and in any event, the loss is only a trifling one.

Mr. Davis:—I hope the amendment will not prevail. The maker pays the express on five or ten pounds of butter, whatever he sees fit to send. It will cost just about what the butter is worth if it is returned. Anyone who is interested enough in this Association to send butter here will not kick if he fails to get 92. But I am not sure that it is best to raise this standard to 92. Butter would have to score above 92,—that is to say $92\frac{1}{2}$ or 93; today 90 gets nothing; but 91 gets one share of the funds that we have.

Mr. Aitken:—How many scored less than 92 this year?

Mr. Davis:—About eight out of 130 I believe.

Mr. Aitken:—Clearly our standard is nearly up to 92 now. I therefore second the motion that it be raised to 92.

Mr. Hitchcock:—To send back the butter scoring 92 or under would impose an unreasonable and unnecessary burden on the Secretary.

Mr. Bronson:—Mr. Hitchcock fails to grasp my idea. The Association would be to no expense in sending it back, I would propose to let the owners take it back. The Association will not have to pay expressage either way. My idea is this. There are many good dairymen who cannot attend these meetings. Some-

times we can get them to come and bring a package of butter and have it scored correctly. They have got to donate that butter to the Association. They would be pretty sure not to come if they thought it would not score over 92. As a matter of education. I would like to send a sample of butter, and the next year better butter and so on. Unless this amendment passes I fear no one will send butter here unless he knows it is all right.

Pres. Morse:—Shall the amendment prevail and are you ready for the question?

Amendment put and lost.

Pres. Morse:—The question reverts now to the original motion. Are you ready for the question?

Mr. Adams:—I opposed this motion last year. I do not rise to oppose it now, but simply to ask, is it best? I am willing to abide by the decision of the Association, but you should understand that a score of over 90 is a pretty fair score. Give it just a little thought before you vote.

A Member:—How much higher is the average score this year than last?

F. L. Davis:—Just $\frac{1}{8}$ point; the average score $94\frac{1}{8}$.

Pres. Morse:—Are you ready for the question? As many as are in favor of this motion, say "Aye." Those opposed, "No." The "ayes" appear to have it; the ayes have it, and I declare the motion carried.

Adjourned until Thursday morning at 10 A. M.

THE BANQUET.

Probably the most impressionistic event of the meeting was the banquet, which about 350 people sat down to at eight o'clock, Wednesday evening, in the Van Ness dining room. Souvenir menu cards, a salt shake and an ash tray were at every plate—gifts from separator and salt firms exhibiting at the meeting.

When all were seated there appeared in line 45 waitresses, bringing trays laden with soup plates, all under charge of captain-generalissimo H. E. Woodbury. Soon the orchestra, tuning in the entrance way, burst into rhythmic melody, the finest strains almost inaudible above the chatter of assembled guests at the five long tables. It was a grand occasion already and a serious one apparently for the hotel men, who were thoroughly alert to their responsibilities.

THE SPEECHMAKING.

After the "all out" order to the waitresses, President H. C. Bruce introduced F. L. Greene of St. Albans as toastmaster, saying of him that President McKinley remarked that he was the best toastmaster he had ever seen behind a table.

Mr. Greene ably sustained his reputation, presenting the speakers with clear and interesting remarks and an inexhaustible fund of applicable stories. He ranged from the ludicrous to the poetical, or to serious discourse, moving men to sympathy. His elastic smile, on occasion, was one of the treasured memories of the evening.

MAYOR JAMES E. BURKE

Responding to the sentiment, "The Queen City," spoke of Burlington as the convention, educational and trading center of the State. He is a man of directness—a man of the people, and voiced many truths. He paid a tribute to Gov. Bell, which

evoked tremendous applause, when he said Vermont was as well governed as any State in the Union, and in closing said the future of Vermont would be what the farmers made it.

GOVERNOR CHAS. J. BELL

Was introduced by Toastmaster Greene who said "It is a great thing to be Governor, but a greater thing to be worthy of it." Governor Bell, always practical, did himself proud. He said Vermont was not great in area, but otherwise. He praised the dairy calling as an honor to the State, compared old with new methods, in the practice of which we lead as butter producers, touched on subjects of interest to dairymen, urged the ladies to give poultry raising and egg production more attention, and predicted a new era for the State, which may yet become the greatest in the nation.

MASON S. STONE

Spoke of the Vermont school teacher as one of our most important agencies for good, but that she is inadequately paid, her average salary being less than that of mill hands, women clerks and stenographers. Mr. Stone told several practical stories from his own experience and was listened to with keenest pleasure.

MRS. ADDIE HOWIE

Of Wisconsin spoke of "Women in Agriculture," and said they were no innovation in that capacity. That when women began to go outside and take an interest in things there would be better agriculture, better barns and better cattle. She urged the ladies to learn to love the birds and animals of the farm, to get the best from them. She was a ready and remarkable speaker, and it is said, personally owns a large dairy farm.

COL. C. W. SCARFF

Gave a prelude of prose as an introduction to a symphony of poetry on "The Dignity of Labor," such as he is always able to evolve for these occasions. He spoke of the farmers as the very bone and sinew of the country. Mr. Scarff is a free and natural speaker.

PROF. J. W. DECKER

Of Ohio was next introduced. He was a profound student in appearance but his stories lacked pith. He spoke of the high

record attained by Vermont butter and cheese makers and said it did him good to come here from the hustling West and see the earnestness of the Vermonters.

ALLEN M. FLETCHER

of Cavendish advocated the new Vermont idea and said conditions in Vermont today were due to pie, cider and force of circumstances, largely force of circumstances, and was pleased to note the competitive spirit among farmers as it would tend to betterment all along the line.

GEORGE AITKEN

Manager of the Billings Farm at Woodstock was the last speaker, and with his delightful Scotch accent indulged in a number of witty hits at the expense of the toast-master and enjoyed Mr. Greene's pretended discomfiture hugely. Mr. Aitken referred to the gathering as "the 400 of Vermont," and told them of the competitive interest in other states over our unrivalled butter standard. Mr. Aitken was one of the most entertaining speakers of the evening.

"America" was sung by the guests, led by the orchestra, three cheers were given for Toastmaster Greene and the assembly disbanded at 12.20 to linger and visit in the hotel offices and their rooms for yet another hour.

Thursday morning, Jan. 11, 1906.

Pres. Morse:—The committee on resolutions is now ready to report.

RESOLUTIONS.

The Vermont Dairymen's Association extends its hearty thanks to the railroads of the State, to the people of Burlington, and to all others who have aided in making this one of the most successful of the annual meetings of the Association. In particular we desire to place on record our appreciation of the generosity of the Hon. U. A. Woodbury in placing at the disposal of the meeting the free use of a building especially well adapted to our needs.

To his Honor, Mayor Burke, we express our gratitude for his cordial welcome and his untiring efforts in our behalf.

We record our satisfaction in the interesting and instructive addresses we have heard from the speakers provided by the executive officers, and to the toastmaster who made our banquet an occasion long to be remembered.

We have learned with deep regret during the past year of the death of Hon. O. M. Tinkham of Pomfret. As President and Secretary, he long served the Association with devotion and efficiency. As a private member his interest continued until his death.

During the year just closed, the Hon. J. O. Sanford of Stamford has passed to his reward. As President of this Association, as a member of the State Board of Agriculture, and as State Highway Commissioner, he rendered most valuable service to the State. Of high character, of unusual ability and of deep sincerity, he has left behind him an influence that will be long remembered.

Other members have passed away during the year. Their great loss to the Association, we regret, and desire to express the sincere sympathy of the Association to the surviving families and friends of the deceased.

We express also the appreciation of the Association of the careful and conscientious work of the judges who have scored the dairy products. For years Messrs. Bent and Cushman have

performed this difficult task to the great satisfaction of the competitors and the Association.

We recognize the fact that agricultural fairs have proven an important factor in the farmer's education; and as farming is the leading industry of the State, we, as a farmers' organization, favor the reorganization of the agricultural fairs of the State upon a firm and well defined business basis. We favor the appropriation of a moderate sum of money by the State under rigid rules and supervision governing the expenditure of the same.

Believing that the Experiment stations of the country as a whole, established and maintained with Federal funds, have furthered the interests we represent, we cordially commend to our Senators and Representatives in Congress, House Bill 345, introduced by Congressman Adams of Wisconsin, increasing the stipend of these institutions and their power for good.

We heartily commend the efficient work done by the Vermont delegation in Congress, both in the House and Senate, in having had placed upon our statute books an oleomargarine law which protects the dairymen from dishonest competition, and we express the earnest hope that no efforts to impair the efficiency of that law by direct or indirect means shall prove successful.

ERNEST HITCHCOCK,	}	Committee.
W. V. BEACH,		
GEO. W. PIERCE,		

Moved by Mr. Smith, seconded by Mr. Jenne that the resolutions be accepted and adopted. Carried.

Pres. Morse:—We are now to have the pleasure of listening to a gentleman too well known to need any introduction or any eulogy of mine. I am greatly gratified to introduce Prof. J. L. Hills, Director of the Experiment Station at Burlington.
(Applause.)

IN THE MATTER OF THE VERMONT COW CENSUS.

JOSEPH L. HILLS, DIRECTOR EXPERIMENT STATION,
BURLINGTON, VT.

Last spring a pleasant and mild mannered gentleman came into my office and counseled with me. He stated that he was instructed by a prominent dairy paper to take a cow census in Vermont. He had already spent some little time in Rutland and Addison Counties and wished my judgment as to other locations. I directed him to two good dairy counties, Franklin and Orleans. The results of his study of 100 Vermont herds were published from May to August. The data which he gathered and the statements he made have provoked much criticism. Data, statements and criticisms alike are sufficiently important to warrant their consideration at this meeting. I do not maintain that my views are of necessity orthodox, or that they need to be accepted; but I trust my review may give rise to a discussion on the floor of this meeting which will tend towards better things. It is to be deplored that those who most should profit thereby will neither hear it now nor read it later nor heed it any time.

WHAT IS A COW CENSUS?

Let us at the outset get clearly in mind just what is a cow census. The system employed is essentially as follows: The party taking the census visits and consults with each farmer as to his methods of feeding and caring for his stock. He then determines as nearly as may be the amounts of the sundry roughages and concentrates that are fed and figures their cost, since owners seldom possess definite knowledge as to these matters. He takes creamery statements as evidences of income. A cow census is therefore simply a statement from several farms of receipts for milk or cream sold on the one hand, and of expenditures for food on the other, coupled with a few generalities as to conditions, environment, etc., the data being derived from the creamery statements of actual receipts and the owners' statements as to the use of fodders and feeds, the latter being subjected to the careful and experienced scrutiny and modifications of the census taker. This

scrutiny and modification are needed since the general statement of farmers are apt to be so far from accurate as to be of doubtful value. This procedure affords results which, while far from accurate, possess at least considerable comparative value.

A cow census does not pretend to tell the whole story. It does not consider several items on each side of the account. It deals with food and the main sales product only. The original cost of the plant, of the cows, interest, depreciation and taxes, care of the animals, cost of manufacturing the products, etc., on the one side increase the cost of producing a quart of milk and a pound of butter. The skimmilk, calves, sale of fat or old cows, the manure, as well as the relation of the dairy to the food supply of the farm household are important items on the credit side of the account. The relationship of the one to the other is bound to be a variable one. It is assumed for working purposes, however, that these may be offset one against the other. Such an assumption, which is not without warrant, simplifies the situation and enables a clear cut comparison of outgo and income.

THE ESSENTIAL RESULTS.

Mr. Lyon's investigations covered 100 herds, varying in size from five to seventy and averaging nineteen cows, just such as may be found all over the better dairy sections of the State. Indeed there is reason to believe that on the whole they were, if anything, a bit better than the average Vermont dairy herds in milk and butter yields and, perhaps, in care and feeding. Thirty-eight contained a sufficient sprinkling of Jersey blood to warrant the use of the term "grade Jerseys"; Ayrshire, Holstein and Guernsey bloods were dominant in ten herds; the remainder were mixed lots of grades or so-called natives. The estimated cost for food ranged from \$32.90 to \$41.00 per cow, averaging \$36.50. These estimates were based on the average cost prices for grain feeds and on arbitrary prices applied to hay, silage, corn fodder, etc. Hay was rated at sales price, \$12 a ton; silage at \$3 a ton; pasturage at \$5 per cow. The average income per cow varied in the several herds from \$15.82 to \$63.57, and averaged about \$34, being in each case the actual cash receipts from the creamery. The butter yield per cow ranged from 84 to 315 pounds and averaged 175 pounds, and the price received for butter fat from 19.7 cents to 27.2 cents, averaging 22.7 cents. The creamery money returns for a dollar spent for feed, including both purchased and home grown materials, varied from 42 cents to \$1.57 and averaged 93 cents. The profit and loss account for the several herds varied all the way from a gain of \$22.57 to a loss of \$21.68 per cow and averaged a loss of \$2.50. In other

words the average cow of one herd made \$22.57 worth more butter than her food cost, while the average cow of another herd made \$21.68 less than her food cost. 32 of the 100 herds made a profit over and above the food cost and 68 failed to do so. And this in three of the better dairy sections of this dairy State of Vermont! Let me once more revert to the fact that the average butter production in these herds was probably if anything a shade above rather than below the average, being 175 pounds per cow. The average milk production is not stated, but it must have been in the close vicinity of 4,000 pounds.

LOWEST, HIGHEST AND AVERAGE RESULTS. Vt. Cow Census.

	Lowest	Highest	Average
Cost of food	\$32.90	\$41.00	\$36.50
Creamery checks	\$15.82	\$63.57	\$34.00
Pounds of butter fat. Lbs.	72	270	150
Pounds of butter. Lbs.....	84	315	175
Price received for fat.....	19.7 cts.	27.2 cts.	22.7 cts.
Creamery returns for a dollar spent for feed.....	42 cts.	\$ 1.57	93 cts.
Profit and loss.....	\$21.68 loss	\$22.57 gain	\$2.50 loss

32 herds made a profit; 68 herds made a loss.

CRITICISMS.

The publication of these findings excited much comment in Vermont dairy circles. Some men dismissed the matter in a cursory fashion, simply saying that Mr. Lyon's name was slightly mispronounced, that it should have been the synonym of falsifier. Such an assumption is unwarranted. I hold no brief for this gentleman or for the paper which he represents, but I firmly believe that he simply stated things as he saw them and neither misrepresented nor colored the results. Whether he saw them correctly or not is another matter. Another equally well trained eye might have given them different. The paper's reputation as a dispenser of the dairy gospel is above reproach. Its senior editor, who more than any other man has been the father and promotor of the cow census idea, has nothing but kindly feelings towards Vermonters, whom he has several times addressed in meetings of this character to their great edification. In brief, the most that can be imputed are errors of judgment.

The published results of this study have led some of the members of this Association to express themselves in the public print. Some have dipped their pens in ink, others in tears, and some, I fear, in oil of vitriol. Vituperation is not worth consideration. Abuse is a poor answer to argument. Mortification is a better mental attitude to assume, though not a necessary

one. I believe, however, that a careful analysis of the data and of the deductions which Mr. Lyon has drawn may prove of distinct advantage, and I mean this morning's remarks, inadequate though they may prove, to be of this general character.

Some of the criticisms have quite missed the point. For instance, one of my good friends expresses regret that some of the better dairy sections of the State were not visited and cites the good results obtained in certain locations. This gentleman misconceives the true function of a cow census. It is not an advertising scheme to boom the dairy interests of the State or of any section. It is not designed to exploit herds of known excellence. Its primary object is to indicate the difference between herds. Its main function is to point out unprofitable rather than profitable herds. Its study impels one to put on sackcloth and ashes rather than fine raiment. In my judgment Mr. Lyon did just right in not going to Pomfret or to Ryegate, where, as the whole Vermont dairy world knows, high grade cows are milked and high grade work done. It were far better that he seek average dairy sections rather than those of highest dairy excellence; and hence he went to average dairy farms in the countries mentioned as fairly representative dairying locations.

RESULTS IN OTHER STATES.

As further proof that there was no animus in this matter of the Vermont cow census, let me very briefly indicate the general outcome in the censuses taken in other states.

The census taken nearly 20 years ago in Jefferson County, New York, covering over 300 herds of over five thousand cows, showed that had the feed consumed by the cows been sold at local market prices, the total income would have been \$25,000 more than that received for the milk at the cheese factory. In other words, these five thousand cows ran their owners into debt that year over \$25,000, if the proceeds from the sale of milk are considered the sole income.

Forty-eight herds in Fond Du Lac County, Wisconsin, in 1903. Ten herds failed to pay their way and 38 succeeded in paying their way. Returns for a dollar's worth of feed ranged from \$2.04 to 70 cents, feeds being rated rather lower than in Vermont.

Onondaga County, N. Y., 1902. Forty-five herds, 11 did not pay their way. Largest returns \$2.37; smallest fifty-one cents per dollar spent for feed. Only six of the forty-five failed to receive good proteinous feeds.

Bainbridge, N. Y., 1902. Investigation of 100 herds made by Mr. Lyon in his own home town. 42 herds failed to pay their

way. Largest returns \$1.67; smallest forty-six cents per dollar spent for feed.

Pennsylvania, fifty herds, 12 did not pay for their keep. Returns ranged from \$1.84 to fifty cents per dollar invested in feed. Only four out of fifty patrons failed to buy and use some proteinous feed.

Iowa, 1900, 100 herds, 38 failed to pay their way. The largest return per dollar of feed was \$2.64; the smallest 42 cents.

Wisconsin, 1899, 100 herds. Ninety-eight paid their way, two did not,—an exceptional record. Cost of feeding was extremely low. Largest returns for one dollar of feed, \$2.08; smallest 96 cents.

SALIENT RESULTS IN OTHER STATES.

State	Herds	No. making loss	No. making gain	\$1 for feed made product worth from to	
Wisconsin	48	10	38	\$2.04	70 cts.
New York	45	11	34	2.37	51 cts.
New York	100	43	48	1.67	46 cts.
Pennsylvania	50	12	38	1.84	50 cts.
Iowa	100	38	62	2.64	42 cts.
Wisconsin	100	2	98	2.08	98 cts.
Pennsylvania	100	40	60		

The comparison between States is meaningless because of differences in conditions. Variations in prices paid for feeds and obtained for products in particular are important factors. For example, in a census now being reported for Minnesota, hay is rated at \$5. It is rated at \$12 here. The Wisconsin 1899 census in which but two herds failed to pay their way, was taken when feed was cheap and at a point close to centers of feed production. The Vermont census of 1905 was taken when feed ruled high and a thousand miles from Minneapolis, Chicago, Peoria and Memphis. In New York, Connecticut, Vermont and Pennsylvania, where apparently the cows are poorer than those in the West, much of this apparent inferiority is due to the high price at which hay is valued, a commercial consideration. I have not had time to go into this matter fully, but venture to predict that, barring the Wisconsin 1899 census, the production record of the Vermont census will compare fairly well with that of the other States. And finally there is the personal equation to be reckoned with. Had Mr. Goodrich who took the Wisconsin census taken that of Vermont and had Mr. Lyon who studied the Vermont herds taken the Wisconsin census the results would

probably have differed somewhat owing to the elements of judgment entering into the matter of determining the facts as regards the cost of feeding. However it is the broad and not the narrow view which should be taken. The results as a whole rather than in detail are what should be considered.

REASONS FOR SUCCESS AND FAILURE.

According to Mr. Lyon's statement on 32 farms in the Vermont census a profit was made from the creamery sales; on 68 a loss ensued. What is the relationship of modern methods to these outcomes?

There were 15 silos on the 32 farms where profit ensued.

There were 7 silos on the 68 farms where no profit ensued.

Rich concentrates were used on 25 of the 32 farms where profit ensued.

Rich concentrates were used on 38 of the 68 farms where no profit ensued.

Clover hay was fed on 4 of the 32 farms where profit ensued.

Clover hay was fed on 3 of the 68 farms where no profit ensued.

The manure was thrown in the yard on 8 of the 32 farms where profit ensued.

The manure was thrown in the yard on 28 of the 68 farms where no profit ensued.

The manure was well handled on 20 of the 32 farms where profit ensued.

The manure was well handled on 28 of the 68 farms where no profit ensued.

22 of the 32 farmers took agricultural papers and 6 of them special dairy papers.

27 of the 68 farmers took agricultural papers and NONE of them special dairy papers.

6 of the 32 herds where profit ensued were native cattle.

24 of the 68 herds where no profit ensued were native cattle.

26 of the 32 herds where profit ensued were grades of dairy breeds.

42 of the 68 herds where no profit ensued were grades of dairy breeds.

Of the barns on the 32 farms 21 were good, 7 fair, 4 poor and 15 were well ventilated.

Of the barns on the 68 farms 22 were good, 21 fair, 15 poor and 15 were well ventilated.

Reducing these data to a common and comparable basis:

REASONS FOR SUCCESS.

On farms where profit was made with the dairy as compared with those where loss ensued:

Silos were 5 times as frequent.

Concentrates rich in protein were used half again as frequent.

Clover hay was fed 3 times as often.

The care of the manure was half again as good.

Agricultural papers were twice as common and apparently several times as good.

Dairy papers were taken on a fifth of the farms in one case and on NONE in the other.

Improved blood was a third more common in the one case than in the other.

Good barns were twice as common in the one case as in the other.

It is interesting to note Mr. Lyon's running commentaries touching the several herds. A typical one on a farm where "progress" was *not* the watchword reads "No silo, no dairy papers, no attention to farm management and no profit. The farm is for sale." A typical one where the outcome is satisfactory reads,—"The cost of keeping is reduced by the silage. stable is hardly modern but fairly well lighted and reasonably clean. There is a manure cellar. Good care is given the cows and they respond quite well. Some of the best farm papers are taken and read."

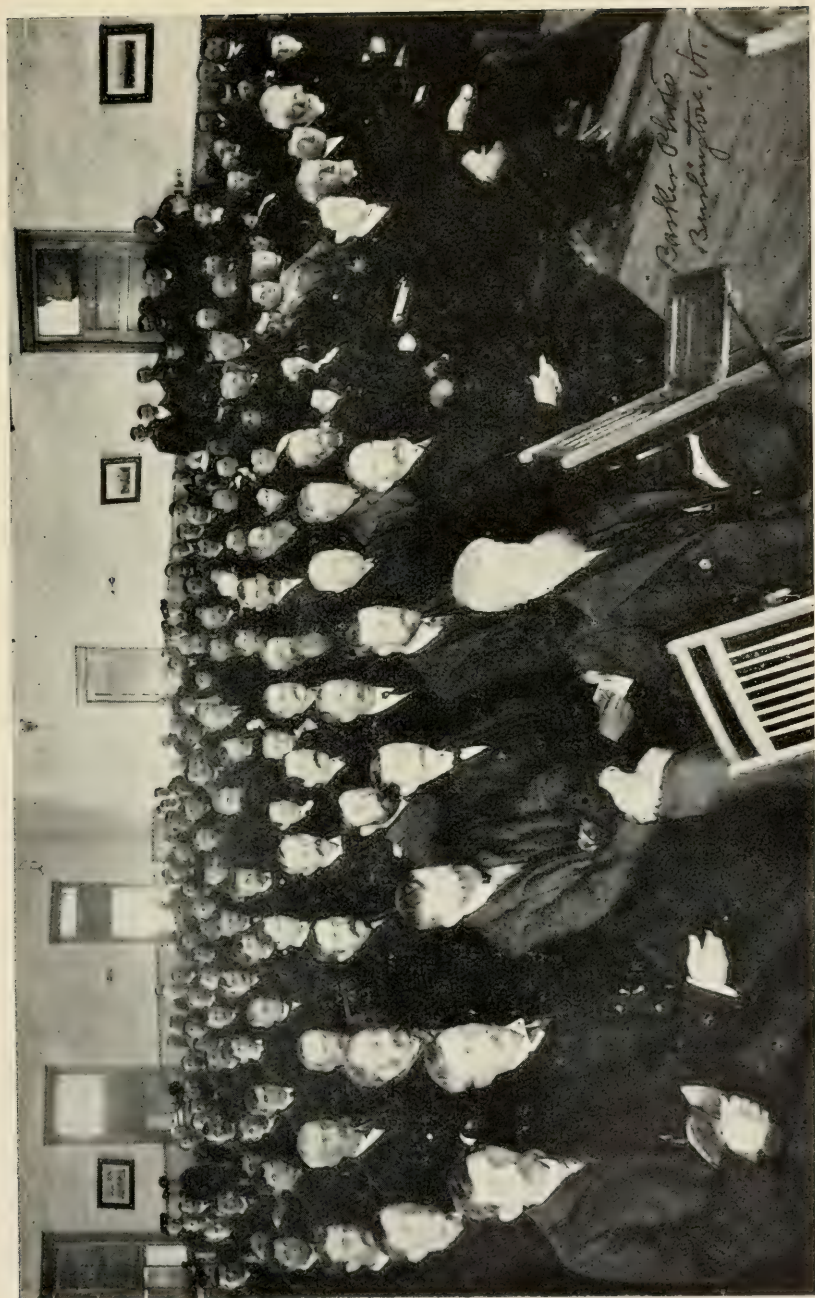
It is of interest to note the relationship which seems to exist between trained intelligence and expert supervision on the one hand and their relative lack on the other. The proportion of the total number of herds in each county which returned a profit over and above the cost of the feed were as follows:

Orleans County, 27 percent.

Franklin County, 32 percent.

Rutland County, 57 percent.

Roughly speaking, one herd in four in Orleans County paid its feed bill; one herd in three in Franklin County and one herd in two in Rutland County. What is the reason for the differences? It is well expressed in Mr. Lyon's own words. Referring to the 14 Rutland herds, he says, "The larger number are under the oversight of one thorough going superintendent, an agricultural college graduate of practical ideas and of force, though of quiet demeanor. The results show quite a variation, more so than I know how to explain. Feeds are practically the same and different breeds would not explain the variation. * * * Doubtless there are factors that enter into the problem, but I doubt whether it can be fully answered without taking into account the factor of the personal equation of the caretaker of the



Cassidy Photo
Burlington, Vt.

A CORNER OF AUDIENCE HALL.

farm." "Several of the farms are worked by different farmers on shares. Much improvement has been made on them and they are already made to pay a fair rate of profit. The plans of the superintendent are logical and in time he is practically certain to work out his problem to a successful termination."

ANOTHER REASON FOR SUCCESS.

Orleans County—One herd in *four* paid.

Franklin County—One herd in *three* paid.

Rutland County—One herd in *two* paid.

Why better results in Rutland County? "More than half the farms under the general oversight of one thorough going superintendent, an agricultural college graduate." Good breeding, good feeding, good reading! Trained brains!

The fact that intelligent brains are supervising the work about Proctor is evidenced not only in the creamery returns, but also in the character of the rations used; in the large number of silos (nine on fourteen farms); in the good grade of barns (eight out of fourteen); and in the fact that in but two out of fourteen cases is the manure thrown out into the yard. I may be pardoned for expressing my gratification at Mr. Lyon's statements, for the young man who is general manager of these farms is a graduate of the Agricultural Department of the University of Vermont. This general outcome is recommended to the consideration of the man who believes that the so-called "book farming" does not pay.*

No candid man can study the results of this census without consciously or unconsciously realizing that there is a clear parallelism between success and intelligence. Brain training is vindicated by results. Silage, clover hay and proteinous feeds; manure cellars and pits and frequent hauling; warmth, light and ventilation in barns; good breeding, good feeding, good reading; on the one hand. Dry corn fodder, late cut hay, corn meal and oats; manure in the yard, infrequently hauled; cold, dark, ill-ventilated stables; miscellaneous breeding, haphazard feeding, no reading; on the other hand. One may perhaps criticize Mr. Lyon's assumptions, may wish that in this, that or the other particular he had done differently. But *these minor matters do not lessen the validity of the main proposition, that to the owners of a large share of these 100 herds so small a money return was*

*It is interesting to note that the creamery sweepstakes and association gold cup was awarded to the buttermaker of the Proctor creamery who made the premium butter from the milk furnished by these dairymen and others. Is there not a connection to be traced here?

paid by the creamery as to make the enterprise at best a doubtful one; that, in other words, there are a great many Vermont dairymen who are not succeeding and that the intelligent ones are not often found in that list. Such a showing ought to incite to better things. Take, for instance, numbers 74 and 80, Orleans County dairymen, living less than a mile apart, cream going to one creamery and paid for by one management. Note the comparative results.*

	No. 74*	No. 80*
Cows	16 grade Jerseys	20 grade Jerseys
Cost of food	\$37.50	\$38.50
Creamery checks	\$15.82	\$59.22
Pounds of fat	72	256½
Pounds of butter	84	299
Price received for fat	22 cents	23.2 cents
Feed roughage	Hay, little silage	Hay, corn fodder
Concentrate	Bran, cottonseed meal, distillers grains (6 lbs.)	Bran, cottonseed meal (4 to 7 lbs.)
Stable		Good
Reading	One farm paper	Good; a careful student of the needs of a dairy cow

Mr. Lyon's comment; "No. 74 feeds fairly well apparently, but in all probability has very inferior animals."

As to my personal judgment of the validity of the results of Mr. Lyon's work I am free to confess that I think his price for hay is set too high. This greatly increases the estimated cost for food, since hay is the main source of food used. Twelve dollars a ton was undoubtedly the average sales price, but in selling hay one sells not only food but fertilizer, while in feeding hay the latter is not sold but is retained upon the farm. It is a moot point whether it is or is not just to charge the cows the full sales prices. If, however, it is lowered to \$10 or even to \$8, the record of the average herd will be barely brought upon the plus side of the comparison. Then too, as has already been remembered the personal equation of the observer is an important matter. A study of the sundry censuses taken by Mr. Lyon and by others elsewhere leads me on the whole to believe that he is on the bear rather than on the bull side of the market; perfectly honest and sincere his judgments, thoroughly well informed as to and experienced in the special line of work, but inclined to-

*These are Mr. Lyon's numbers and have no reference whatever to the creamery notation.

wards overestimating food costs. This statement however is no indictment of the essential validity of the outcome of a difficult task like taking a cow census. It should be remembered that *the data have comparative rather than absolute values and that the exact statements are of little service.* Take for instance, Nos. 47, 58 and 62. No. 47 feed fifty mixed cows at a loss of 24 cents per cow; No. 53 feed sixty-five grades at a loss of \$2.78 apiece; No. 62 fed seventy grades from which he made a net gain of \$20.50. No. 62 can feel fairly well satisfied with the outcome. Whatever price may be allotted to hay, he is doing well. It is not an important matter with No. 47 however, whose results are on the border line, whether he has made a 24 cent gain or 24 cent loss. Whether the price for hay is or is not correct, his success is not a glittering one. Some of his cows—or else his methods—are not worth while. As for No. 58, whatever price—within reason—is allowed to hay, his cows certainly are not doing satisfactory work. And what shall we say for Nos. 73 to 79 inclusive, where losses per cow ranged from \$15.36 to \$21.68, the best of whom made barely 120 pounds of butter per cow? They probably say for themselves that it is all a blank lie, and continue in the same paths. Enoch is wedded to his idols.

WHAT CAN BE DONE?

The important question now arises, what can be done for the contrite and chastened dairyman who occupies the mourner's bench, who wants to do better but does not know just how? In other words, what practicable procedures may dairymen inaugurate who fail to make the two ends of feed and creamery check meet? They should and they readily may:

1. Weigh the milk of each cow.
2. Test the milk of each cow.
3. Learn to judge a cow as to her dairy abilities.
4. Apprehend and put into practice the fundamental principles of dairy feeding, of dairy sanitation, and of manure handling.

Each and every one of these procedures is entirely practicable and is practiced on thousands of dairy farms. Let us reason about them for a while.

WEIGHT OF MILK.

It is really such a simple thing for a dairyman to do to determine the milk yield of each cow, the time element is so negligible, the apparatus so simple, the operation so kindergartenish, and the information afforded so illuminating that it is

incredible that so few carry it out. Spring balances with pointers so set that the empty pail brings it to the zero mark, a ruled sheet of paper and a pencil constitute the apparatus. Hanging the full pail on the scale, noting, recording and footing up the totals constitute the operation. That is all.

Even this relatively small amount of work may be reduced to but one-tenth of its volume without affecting the essential accuracy of the results. If one weighs the milk of each cow during any three days in each month, say, for instance the 14th, 15th and 16th, or the 10th, 20th and 30th, and then puts a zero at the end of the addition, the result will be close enough to the weights which would have been obtained during the entire year had weights been made daily, that is to say, close enough to enable one to detect profitable animals. Of course one naturally takes cognizance of a shortened month if the animal comes in or goes dry during the month. This statement as to the validity of the results thus obtained is based on a thorough survey of the immense mass of data accumulated during seventeen years at the Vermont Station with a herd from a dozen to seventy cows.

What does it mean in terms of time? Twenty cows in milk on the average, say ten months in the year. $20 \times 6 \times 10$ equals 200 weights of milk in the course of a year. Separately to weigh and to record the milk of each cow, if scales are conveniently placed, can hardly take more than half a minute per cow. It takes us less than that. This totals 600 minutes, or one working day of ten hours for one man; and as a result of that day's work one gains a close knowledge as to the efficiency of his several cow machines as milk makers. Scales cost about \$3.00; paper and pencil 3 cents. Is not such information worth so slight an expenditure?

WEIGHT OF MILK.

Weigh on 14th, 15th and 16th of each month and add a zero.

For example:

		Betty.	
14 A. M.	17.5	lbs.	
P. M.	17	"	
15 A. M.	18	"	95
P. M.	17.5	"	0
			950 lbs. for month.
16 A. M.	18.5	"	
P. M.	16.5	"	
		95	

Apparatus.—Chatillon Scales: a ruled sheet of paper: a pencil.
Total cost, \$3.

TEST OF MILK.

The testing of the milk is more of a proposition than is weighing the milk. It involves the use of, but not the possession of, a Babcock tester. It implies some little knowledge of sampling and testing. Here again the time and effort needed to this end may be minimized by making careful choice as to the time of sampling and by co-operative testing. A thorough survey of the mountain of data hitherto referred to (our herd is under constant observation both as to the weight of milk and its test) enables me to say with entire assurance that if properly taken composite samples are analyzed twice a year essentially accurate results are obtained. If a sample is taken when the cow is one or two months along in lactation, and another when she is five or seven months along in lactation (the five months' period being safer for cows which go dry early) the average of the two analyses will afford results which nine times in ten will be quite close to those which are obtained when samples are frequently taken. In other words, sampling and analyzing twice a year suffices, provided samples are properly taken at proper times.

Sampling the milk of a herd of twenty cows in this manner may take four hours' time. The analyses may be made by the dairyman himself if he cares to; or they may be made by the creamery buttermaker for a small sum; or some young man or woman in the community may own a Babcock and do this work at a financial profit to himself, and to the advantage of the dairyman; or, in exceptional circumstances, the Experiment Station may handle the samples. With, then, weights of milk, and tests in hand, the simplest mathematics will indicate the relative standing of the various animals, and whether or not they are failing to make adequate return for the investment in food, care, etc.

TEST OF MILK.

Composite samples, two in number during the year; taken one when cow is 1 to 2 months and one when 5 to 7 months in lactation. Use average of the two.

Analyze samples yourself; or have creameryman do it; or have some neighbor do it.

Apparatus.—Fruit jars, a gill dipper, formalin (to keep samples sweet), Babcock tester and outfit. Total cost, \$5.

CALCULATION OF BUTTER VALUE OF COW.

Betty : came in September 1, dry June 30.

	Weight	Test
Jan.	66	
Feb.	51	5.00
Mch.	42	
Apr.	30	
May	24	564 lbs. milk.
		0
June	12	5640 lbs. milk.
July		4.6
		33840
		22560
Aug.		6) 259.440 lbs. fat.
Sept.	95	
		43
Oct.	90	4.20
		302 lbs. butter.
Nov.	81	
Dec.	73	
	564 lbs.	4.60

It should be remarked, however, that a single year's trial is not always to be depended upon. There may be reasons for an otherwise good animal doing poorly in some given year. In other words, the information thus obtained needs to be interpreted with judgment.

These procedures are not difficult to put into effect, and they do this much,—they give within limits a fair notion as to the dairy worthiness or worthlessness of the sundry animals.

An editorial in a recent issue of a New England Agricultural paper utters a diatribe on this matter and attempts to read him who urges better things a lesson. It says: "We are out of patience at the way scientific workers approach this vitally important question of the pressing need of more good cows in our dairy herds, and at the way that they leave it to be understood they have given an easy solution. Dairy men know as well as they do that there are poor cows in their herds * * and they would gladly exchange them for better. The stock instructions given are to clean out these "robber cows" and replace them by better. Do these * * teachers * * realize what those directions * * actually mean when * * put

into actual farm practice? The individual doing it may be helped, but there are no more good cows than before the change was made. What has been gained by the sharper man * * is lost by the other fellow * * There are not superior cows enough in existence to meet the wants of all who realize the advantage coming from their possession."

The writer who penned this editorial is apt to be querulous, and in this particular case has, in part at any rate, missed the point. Granted that there may not be "superior cows enough in existence to meet the wants of all who realize the advantage coming from their possession"; does that justify one for harboring cows whose milk yields do not sell for as much as their food costs? If some Anna Eva Fay could pass through a herd and unerringly point out the unprofitable animals, and if the owner was convinced of the infallibility of her verdict, would he not at once remove them? So should he when weight and test point out the cow boarder. The "easy solution" of the scientific worker is easy so far as culling is concerned; but the rest is another story.

STOCK JUDGING.

To weigh; to test and calculate; to compare cost of keeping within income; to cull. These are relatively simple and fairly certain procedures; but the rest is not so easy to accomplish. One can kill cows in a moment, but to get better ones in their places means time, money, special skill, rare judgment, many failures and disappointments and slow progress. Destructive processes are always simpler than are constructive ones.

The usual advice as to the use of a registered bull is more commonly heeded today than hitherto; yet its adoption does not provide a panacea since the results are often apt to be disappointing. Registration is far from being certification. It has been aptly said that "there is no scrub so poor as the pure bred scrub." Few sires beget offspring materially better than the cows with which they are mated, unless the latter are right poor animals. In other words, the proportion of blanks in breeding is large; and, unfortunately, one cannot always tell blanks from prizes with certainty until three or four years of bovine life have elapsed. For example, we have had at the head of the Station herd during the past ten years three different registered bulls. Each has been accounted among the best get of three famous herds. Their pedigrees in each case showed many fine lines of breeding. And yet, as used on the registered and grade Jerseys at the Station farm, animals which made on the average for a dozen years 325 pounds of butter, the proportion of heifer calves,

which on raising have proven satisfactory, as judged by our standards, has been far less than 50 percent. It should be remarked, however, that the likelihood of successful upgrading is increased in proportion as the original stock is poor. The man whose herd averages 150 pounds can better that record far easier than can he whose herd averages 300 pounds maintain his standing. The selection of the sire, which is to be half of the coming herd, and the breeding of superior heifers, is no easy task, but a complicated problem of uncertain outcome. And yet naught better can be suggested than to make such choice of the head of the herd as seems wisest; and to that end I deem it practicable that those who seek such an animal, as well as those who wish better to know a good cow when they see her, should study thoroughly the matter of relationship of type to performance; that they should learn to judge cattle and to appreciate the meaning of the "points" of the score card; that they should familiarize themselves with such admirably adequate, yet simple directions touching the correlation of form and function as are furnished free for the dairy world in Director Soule's treatise on the "Conformation of Beef and Dairy Cattle," Farmer's Bulletin No. 143, of the U. S. Department of Agriculture; and that they should make use of their apprehension of these assembled concrete expressions of experience in the selection, the purchase and the feeding of cows. He who is thus fortified is apt to make fewer mistakes than does he who has not this special knowledge. To be sure, successful animal husbandrymen are apt to be born rather than made; but their judgments may be thus matured and standardized.

LEARN THE DAIRY POINTS OF A COW.

Get (free) Farmers' Bulletin No. 143, on Conformation of Dairy Cattle, 44 pages, 44 illustrations. Plain, simple, serviceable. Apply Department of Agriculture, Washington, D. C.

Yet, when all is said, "handsome is that handsome does," and actual performance at the milk pail is of more avail than are ideal contours, tortuous milk veins or a prominent pelvic arch. A few observations made at the Vermont Station have pertinence here and illustrate this point. Our cows are under constant observation. We have records extending over ten years of lactation in several cases. These cows were carefully "judged" according to the "scale of points" of the Jersey Cattle Club by a party who was fairly well skilled in judging and who only knew in a general way how good or how poor dairy animals they were. He similarly surveyed two registered Ayrshire herds

which for ten years had been under careful observation by the Station as to milk and butter yields, using, of course, the Ayrshire score card. The outcome was essentially as follows:

30 mature cows scoring 90 or more; 6478 pounds of milk, 321 lbs. butter.

20 mature cows scoring 88-89; 6263 pounds milk, 286 lbs. butter.

12 mature cows scoring 80-87; 5699 pounds milk, 286 lbs. butter.

Again the relationship of udder conformation—be it well balanced, ill balanced, funnel shaped, deficient in any respect, etc.—to the milk and butter yield was similarly studied by one of our senior students using the Station herd with results as follows: Thirty-four cows were surveyed and their records for from one to eight years averaged. Five with finely balanced udders averaged 5725 pounds of milk, eighteen with fairly well balanced glands 5377 pounds and eleven with ill balanced udders 5219 pounds milk. The butter yields were 342, 333 and 324 pounds respectively. Four out of five cows with well balanced udders made more butter than did the average of the eighteen which had but fairly well balanced udders, or the average of the eleven with poorly balanced glands. They also made more than did the average of the herd for twelve years, 324 pounds. Per contra, eight out of the eleven cows with poorly balanced udders made less butter than did the average of the five who were thus well built or of the eighteen whose glands were fairly well built; and their records were all, moreover, below the twelve year average of 324 pounds.

These determinations were made with cows far above the average in productive capacity. It seems fair to assume that had inferior or average cows been under survey, the results would have been even more pronounced. But it all goes to show that the upgrading of a herd by breeding is likely to be a slow process. If intelligence is used, however, the progress taken in the gross, though slow, is likely to be fairly certain, provided that cross breeding is not practiced. This procedure generally results less favorably than does mating with inbreeds.

STOCK FEEDING.

The feeding proposition is a less difficult one to encompass. The results of experimental trial are more quickly apparent and errors of judgment are less costly. Many cows give inadequate milk flows because they are of beef build, placing the food as their ancestry has willed it, on their ribs instead of in the pail. Others on the contrary have failed simply because they have not

had a chance. They have been inadequately fed. Here may be cited the experiment of the Kansas Experiment Station published in its bulletin 86.

The Station authorities bought thirty scrub cows, which, it is stated, appeared on the whole to be inferior in quality to the average herds of the State. These were fed for an entire year on rations rich in protein, designed to stimulate the milk flow. The main roughage used was alfalfa hay, fed during the months of barn feeding of as large quantities as the cows would take. During outdoor life they had pasture with green kaffir corn for soiling. The grain feeds used were mainly wheat bran, linseed meal, kaffir corn and cornmeal; about eight pounds daily in the barn and three pounds while in pasture. These cows averaged for the year 5700 pounds of milk and over 275 pounds of butter. The best one yielded 9100 pounds and the poorest 3600 pounds of milk, the best one nearly 450 pounds of butter and the poorest nearly 160 pounds.

The Kansas Station authorities collected the records of 82 herds in one of the leading dairy sections and found that the average annual yield per cow was 3441 pounds of milk, or 150 pounds less than that of their poorest but well fed scrub cow; that the average yield of butter was 122 pounds, or 36 pounds less than that of their poorest cow. The average return for butter at the creameries was \$19.79 per cow or \$1.60 less than the returns obtained from their poorest but well fed scrub cow, and but little more than half as much as was returned by the average of the entire herd. The Station authorities attribute their success with this scrub herd to three causes:

First, to the fact that at all times the rations given were either balanced or contained an excess of protein, whereas the average Kansas cow on dry feed usually got but half enough protein.

Second, to kindness and adequate shelter.

Third, to the maintenance of a full milk yield throughout the summer drought secured by extra feeding.

Matters of sanitation and manure handling cannot be discussed at this time, important though they are to the solution of this general problem.

TEST ASSOCIATIONS.

I wish to revert, however, once again to the weighing and testing proposition and to tell you something of how this matter is being handled to the north, east and west of us.

When I addressed the Dairymen's Association of the Province of Quebec a couple of years ago I found them agitating the formation of a cow test association. I learn that this work has been carried out during this past year in the Eastern Townships and with considerable satisfaction. A recent "Hoard's Dairyman" gives an account of the pioneer association of this kind in the United States, organized in Michigan last September. The system has been in vogue in Denmark for a decade, and some years ago there were in that little kingdom over 300 associations, comprising over 4,000 members. What is a cow test association? Simply a voluntary organization among neighbors whereby they subscribe small sums and employ some man periodically to visit their herds to weigh and test the milk of each animal, to keep the records, to make the calculations and to report the results. This is all there is of it. In Canada the movement is fathered by the Dairy Commissioner of the Dominion; in Michigan the movement was started by the State Dairy and Food Inspector; in Denmark it appears to have been mainly the product of local enthusiasm.

A brief review of the Michigan scheme may be of interest. At Tremont, where the first Association was started, (there are now two others under way) an expert dairyman visits each member once in thirty days, weighs the milk of each cow for two consecutive milkings, investigates the manner of feeding, the care of the cows and the milk, makes suggestions and corrects defects if practicable. He calculates the amount of feed given each cow and the cost of the same for the preceding month. The milk is tested at the local creamery. At the end of the year, the cost of feed and labor is balanced against the income for each animal, thus indicating the profit or loss for each individual. The cost of the production of a pound of butter fat and the returns for each dollar expended for feed are likewise determined. The records are kept on blanks furnished by the State Dairy Commissioner and a copy is left with each dairyman each month. Semi-occasional dairy meetings are held at the local schoolhouse, where results as to herds and individual cows are compared and discussed.

The expense is borne by the Association. Each member pays twenty-five cents for membership and one dollar per cow annually. The local creamery contributes somewhat to the expense of carrying on the work (it is good business policy for it to do so), and the State Dairy Department furnishes the necessary blanks, books and stationery in consideration of a return of copies of the monthly records of the work of the Association. The work began November first. The dairymen are

deeply interested in the results. The essential points in the contract entered into by the members of the Association are:

1. A statement of the purpose of the organization, i. e., to provide means for the cooperation of its members in testing periodically the milk yields of their cows and for the improvement of their dairy interests.

2. An agreement to pay the sum of one dollar per year for a series of years for each cow owned by each individual for the purpose of defraying expenses, fees to be paid in quarterly installments in advance.

3. An agreement to board and lodge the peripatetic tester for one day each month and to convey him to the next place of work.

4. A provision authorizing the treasurer of the local creamery company to retain the quarterly fees from creamery checks and to pay the same to the secretary of the Association.

This amounts to saying that through cooperation at a price not to exceed one dollar per cow annually and two weeks' board for one man and the transportation of this man twelve times a year to the next place, one secures an essentially accurate statement as to the dairy work of each animal, not to speak of the benefit of the comparison of the outcome with that achieved by one's neighbors.

The Association's employee need not be a man of large ability, nor is it necessary that his scholastic training be more than that of the common schools. He must be able to weigh milk accurately, to record the weights correctly, to sample and to test milk accurately, and to handle figures readily and without error. A practical knowledge of dairying operations and as to modern methods of feeding will make him the more valuable to his employers, but is not absolutely essential to his success. It is not indeed necessary that he know how to test milk, as arrangements may be made to handle the samples at the local creamery. The employee's time will not be entirely consumed in weighing, testing, computing and in travel. He may be required to do other service between times.

In short, the details of the proposition are not difficult to work out; the cost need not be excessive; the work required is simple and within the grasp of any man of fair intelligence; and the results, if accepted in the right spirit, are of great value.

Now in my judgment this is a proposition which this Dairy-men's Association ought to embrace. I have been a member for years and have had the honor and privilege of addressing its members for fourteen consecutive years. I may perhaps be allowed to say that the knowledge of its workings thus gained entitles me to express an opinion as to its work. I believe that the

Dairymen's Association may justly be criticized in that it is a very lively organization for three days in one week in the year and more or less moribund for the rest of the time. I believe that under its constitution and the State law it properly could expend some of its funds in furthering the establishment of test associations among the dairymen of the state, and that if it did this, it would be doing one of the very best things it could do for the dairy interests of the state.

TEST ASSOCIATIONS.

Co-operation among dairymen in cow testing and in systematic record keeping.

First association in Denmark in 1895. There are now over 1000 such associations in Denmark with over 22,000 members.

Pioneer association in the United States in Michigan in September, 1905. Others have been and more are being organized.

Cost to each individual member.

25 cents membership, \$1 per cow annually, board and lodging for one man once a month and conveyance to the next member's place.

Results.

A careful and essentially accurate record of the dairy work of each cow in the herd, at no expense other than that indicated above.

I have lingered long on this subject and have in the main only emphasized old ideas; but the better cow is so badly needed and some of these means of more nearly attaining her upon every dairy farm,—and particularly the practicability of setting some of these means into motion—are so ill-appreciated, that in season and out of season, in classroom, institute meeting and at large gatherings such as this, wherever dairy matters are in hand, I feel inclined to label this proposition, moldy old chestnut that it is, "Exhibit A" and talk and talk and talk about it. Let us do as well as talk! We can if we will get ahead in this matter, slowly to be sure, but yet ahead. Let us keep thinking about it! And then let us do as well as think!

DISCUSSION.

Mr. Carpenter:—In choosing the sire, wouldn't you go back to the dam that the sire came from or, indeed, for two or three generations? Would you not thus get better results?

Prof. Hills:—The sire is well understood to be half the herd; and a person who is looking for the best will naturally look for the blood lines of its ancestry.

Mr. Smith of Morrisville:—As to these Danish associations; does one man do the work of each association and what is the expense?

Prof. Hills:—The Michigan association comprises some twenty-five to thirty members. Its employee simply travels from one place to another,—Monday here, Tuesday there, etc. He visits each herd once a month and weighs the milk of its cows for one day and takes samples. Weights are thus taken twelve times a year and tests are thus taken twelve times a year in each herd. From that data the essentially accurate milk and butter yields as of each cow are calculated. In Denmark, with an average membership of twelve, they probably have some other system as regards the frequency of record taking. The scheme simply means that several men pool the interests.

Mr. Jenne:—In regard to getting rid of the poor cows; what will we do with our hay? I wouldn't know what to do with it. If all the poor cows were disposed of, we would have to sell our hay, and the best hay at that. Then we would have the poorest left to feed the best cows; and if you feed your poorest hay to your best cows you will not get good results.

Prof. Hills:—We are told that Rome was not built in a day; and this proposition will certainly not be one that will be worked out readily or the results arrived at in one or in ten years. But the goal is one towards which we should strive. Mr. Jenne's poor hay has cost him something to get. The land that grew that poor hay I believe could be put to better uses than to grow feed for unprofitable dairy cows; perhaps into forest or into potatoes.

Mr. Jenne:—Suppose the land lay in such a way that the farm was springy and hard to drain? It costs money and you are struggling to pay for your farm. There is bound to be more or less poor hay. What can one do with it?

Prof. Hills:—The unprofitable cow doesn't help you in your struggle to pay for that farm. Use the hay to bed good cows with. There is less food value in such hays than we are apt to think. It often takes about all the energy or food value which such hay contains to enable the cow to digest it. So I believe that such hay is often better used for bedding or even put directly into the manure pile than fed to cows.

Mr. Jenne:—Can you feed butter fat into milk?

Prof. Hills:—Yes. You can do it by feeding such things as cottonseed, linseed or corn oil. I have done it thus and so have others. But it is not butter fat, it is an extraneous fat; and the kind of butter it makes would get no pro rata at this convention. There is just one feed that is fed in this country that permanently, and even that but very slightly, increases the fat content of milk, and that is distillers' dried grains. It is the one exception that proves the rule; and its effect is so slight that it amounts to nothing. A cow giving, say 5 percent, fat in her milk may give 5.1 or in extreme cases 5.2 percent. If given

good rations, cows give an essentially uniform quality of milk thereon. Feed affects the quantity but not the quality of the flow.

Mr. Carpenter:—What is the best cow hay?

Prof. Hills:—"Corn is king and clover queen;" and alfalfa is the ace. If we could grow it that would be the very best hay for cows; and it can be grown in the Champlain valley. But where it can't be grown, early cut hay and clover hay, (and we can grow better clover than many of us think) are to be preferred.

Mr. Jenne:—How are you going to get a sire for your herd? You have told us the results are disappointing many times.

Prof. Hills:—Bulletin 143, U. S. Department of Agriculture, will give you as good instruction as you can get anywhere else for the asking. One must give thorough study to the whole proposition. And it can only be worked out through study and intelligence. It is a long and slow process and one with a great deal of disappointment in it.

Mr. Hitchcock:—It means from \$200 to \$1000 for a single animal.

Prof. Hills:—Very often it would. And the people who invest in such an animal often do well to do so. For instance I was shown yesterday by a member in the Association a paper containing the tests of some 30 heifers in their first lactation, the product of a sire from a certain famous herd in this state. None tested below 5 percent and several over 6 percent. Now that sire undoubtedly was a costly animal; but he was better worth a thousand dollars or more than the average one is worth ten.

Mr. Hasard:—Would you advise the average farmer when getting a sire for his herd to take a high grade calf, the ancestry of which that he knows to have done well under our conditions, or to pay seventy-five or one hundred dollars for something he knows nothing about save that it has got a pedigree?

Prof. Hills:—Mrs. Howie stated the case well when she said that pedigree was not certification. If you know your animal to be from good stock which for some generations back has proved successful as milkers you are full as likely to make a wise choice as if you took a thoroughbred. One makes many errors even in using his best judgment. It is a lottery.

President Morse:—The best is none too good to secure for the Vermont Dairymen's Association meetings. It is my pleasure to introduce to you Prof. E. H. Webster, Chief of the Dairy Division, U. S. Department of Agriculture, Washington, D. C.

President Morse:—Hon. Cassius Peck, Superintendent of the Experiment Farm, extends an invitation to all to visit the Experiment Farm this afternoon. I will guarantee that you will all be repaid for going.

Mr. Bronson:—Prof. Webster's suggestion as to forming test associations should be discussed. This is a good thing for us to consider,—the elimination of cows that are giving inadequate returns. This Association should take the first step towards fathering their organization. We ought to get this thing started before we adjourn.

Mr. Smith:—If I should go home and get several of the farmers in that section to agree to go into an association of this kind, has Prof. Hills any young men or any graduates that he can send to us to do this work if we should wish it?

Prof. Hills:—It would depend somewhat upon circumstances. If the association was a small one with only 100 or 200 cows, there would not be money enough in it to attract one of our young men. But it does not need an agricultural college graduate to engineer it. It simply needs some man who has had some experience in dairying, who can weigh milk and test it. A dairy school student can do it very well, indeed.

It would be well worth while for this Association, before this meeting dissolves, to appoint a committee to consider the matter with a view of reporting at the next convention, or otherwise. I understand there are some two or three hundred dollars in the treasury. I suggest that this Association father this movement sufficiently to give it an impetus, that it supply the necessary blanks and papers, etc. The committee might be given the power to act and be allowed to expend, not to exceed a certain specified sum of money.

Mr. Jenne:—Perhaps I am talking too much; but this seems to me a good thing. It also seems as if we ought to start this ball rolling at this time. It will be a year before we reassemble and if a thing is worth doing, it is worth beginning now. Why can't we have a committee appointed to take this thing in hand? There may be influential members in this Association that have time and experience enough to start one in their own neighborhood if they didn't have to bear all the financial expense. I believe this Association can very well afford to pay for all the blanks and stationery that would be needed in conducting as many of these test associations as may be formed here this coming year. Therefore I move that a committee of three be appointed

by the Chair to take into consideration the matter of cow testing associations, to act for the Association in its discretion, and to expend not to exceed one hundred dollars, from the funds of the Association.

Seconded by Mr. Smith.—Carried.

Committee named by the President:

J. L. Hills, Burlington.

C. F. Smith, Morrisville.

C. M. Winslow, Brandon.

THE COW AND WHAT SHE HAS DONE FOR MAN.

PROF. G. L. MCKAY, IOWA STATE COLLEGE, AMES, IOWA.

Dairying is very much like water; it becomes purer and better from agitation but if permitted to stand still soon becomes stagnant. Looking backward over the advancement that has been made in dairying during the last 25 or 30 years and comparing it with the progress that has been made along other lines of agricultural pursuits, we must confess that we have not advanced as fast as we should, especially as viewed from the producer's standpoint. Thirty years ago it took 211 hours of labor to produce 100 bushels of barley. Today it takes about nine hours. It took 228 hours of labor to produce 50 bushels of shelled corn, and today it takes about a third of that time. To produce 100 bushels of oats takes about one-tenth the labor that it took 30 years ago. It takes about one-twentieth of the time to produce a bushel of wheat that it did 30 years ago. All this is due to the use of modern machinery and the scientific methods of farming.

There is no line of agricultural work that pays better than dairying if done in an intelligent manner. Dairying takes practically no fertility from the soil. A ton of wheat removes about \$7 worth of plant food, while a ton of butter removes only fifty cents worth of these ingredients. At the same time a ton of wheat brings a market price of \$20 or \$22, while a ton of butter sells for \$400. In other words, the man who is running a dairy is practically selling sunshine, air and rain, and very little of the latter, while the grain farmer is disposing of the elements of fertility that sooner or later must be returned to the soil, either in the form of barn yard manure or commercial fertilizers.

The lack of imagination or of original ideas is a great drawback to men in all lines of business. Often you find in men an absolute incapacity to realize an unfamiliar situation, to grasp conditions which are not immediately visible, to recognize facts which to others are a plain and potent element in their life. This

*Received from Prof. McKay for printing.

is quite apparent in the dairy business. Go into almost any section of the country and study the conditions in the various creameries, and you will find men there who are keeping herds that produce possibly 300 pounds or more of butter per cow. In the same community and on identically the same kind of land you will find others who have herds that do not pay for their keep.

The great question is how to arouse the negligent dairyman to action, to see their own opportunities. The frequent holding of institutes and picnics, thus bringing the creamerymen and creamery owners in direct contact with the patrons,—all have their beneficial effects. Some years ago I visited the farm of the late E. D. Tilson, of Tilsonburg, Ontario, Canada, and inspected his famous herd of Holsteins and Holstein grades. Forty of his cows had made an average of 450 lbs. of butter per cow. This gentleman informed me that it was almost impossible for him to convince his neighbors of the necessity of keeping good cows and caring for them in such a manner as to produce the best possible results, notwithstanding the great records made by his cows.

Two years ago I had a letter from Ex-Governor Hoard of Wisconsin, stating that his herd of 30 Guernsey cows gave him returns from the creamery alone, for butter fat sold within a year, within a fraction of \$70 per cow during that year. This shows the result of intelligence.

As Dr. J. G. Holland said:

“We rise by the things that are under our feet,
By what we have mastered of good and gain,
By the pride deposed and passion slain,
And the vanquished ills that we hourly meet.”

It is not necessary for me to state that the cow is a more economical producer than the ox, as this has been thoroughly demonstrated, especially in the densely populated portions of Europe where land is worth \$400 or \$500 per acre. We not only find them dairying successfully but in some cases we find them buying American grain for their cows, and meeting us in competition with dairy products in the English market. Two of the greatest friends that man possesses are the dog and the cow. A man may fall so low that friends and relatives will desert him, but his dog will stand by him no matter how much he abuses him, and he has been known to starve himself when protecting the dead body of his master. The cow in the same way, no matter how poorly she is fed or how roughly she is treated, will still yield milk and cream. She is the only animal that works

night and day. During the day she gathers food and at night she converts it into articles of diet and usefulness for mankind.

This wonderful, moving, living, breathing, active piece of mechanism, this general utility animal who has done so much and received so little at our hands, she who has lifted the mortgages from so many homes and adorned them with all of the beauties of mechanical art and added comforts that come only with genius and wealth, is the peer of all animals.

As our friend Marple of Missouri said "When we awake in the morning, we behold the walls on which the plaster has been held by her hair. We fasten our clothes with buttons, and we comb our hair with a comb made from her horns. We put on our feet a pair of shoes made from her skin, and as we enter the dining room and sit down to a tempting breakfast, we find she has provided us with a plate of butter, a piece of cheese, a cup of milk, a pitcher of cream for our coffee, a plate of cream biscuit, a smoking beefsteak, and for our dinner we have soup made from her tail, delicious roast beef, pumpkin pie made with her cream, sweetened with sugar that was whitened with her blood and made out of pumpkins grown on land fertilized with her bones, and yet we but half comprehend how valuable she is to the human race."

Some woman said "Man is what woman has made him." Whether this is true or not, we can truly say the cow is what man has made her through breeding, feeding and selecting. As we trace her origin we finally go back to the wild cattle, or the cattle in their native state. By inbreeding and selecting we have at the present time many noted breeds of cattle. It would be useless for me to attempt to tell you which one of these breeds you should take, as this would be a good deal like selecting a wife. It depends entirely upon what is desired.

Study the noted breeds of the Jerseys and Guernseys and we find their origin practically the same. Both, as far as is known were bred from Normandy and Brittany stock. The Normandy blood undoubtedly predominated in Guernseys. The environment had much to do with their characteristics. These Islands were not noted for the luxuriance of their native grasses. The productiveness of the soil at the present time is largely due to the number of cows constantly kept on the island. It is estimated that one cow is kept for every acre of grass land. One unchangeable law is, that cattle can be sold off the island, but none can ever be brought in. This restriction is rigid so as to keep the breed pure. The cattle are cared for mostly by women, consequently, they are not subject to harsh treatment. The man who is not especially adapted for dairying would undoubtedly make a failure of this breed of cattle.

When we cross over to Holland, we find the home of the noted Holstein cattle. These differ from the Jerseys and Guernseys in many ways. They have undoubtedly been bred for the production of butter and cheese, consequently they give a large flow of milk. This is possibly the purest breed of cattle we have on record. We find on looking up the history of the famous Ayrshire cow that she was improved by the introduction of Holstein blood. We find also that Holstein blood was used in building up the Shorthorn breed. The Holstein is a big, rangy cow, partaking largely of the conditions of her country, as there is an abundance of luxuriant grass and herbage, the soil being exceedingly rich and well watered. She is adapted for consuming a large amount of coarse fodder, and the succulence of the vegetation has resulted in a very full milk flow, but the milk is low in fat content.

Originally the Ayrshire cattle, natives of Ayr, Scotland, were mostly black in color with white stripes. They were rather small and ill shaped and gave a small flow of milk. By infusion of other blood, the Ayrshire has become one of the leading breeds of dairy cattle. Of late it would seem that some of the breeders of Ayrshire have been devoting too much attention to show cattle. The result is a flat udder with a very short teat.

A great deal of time, in some parts of the country, has been spent during the past 15 or 20 years in trying to improve dairy cattle by crossing with beef animals. The result is that we have a lot of cows throughout the country that are neither good beef nor dairy types, but simply "Scrubs." It is true we have some excellent milkers among some of the beef types, but it has not been demonstrated that such cattle can be successfully bred.

About 30 years ago, Goldsmith Maid trotted a mile in 2.27 and it was heralded throughout the press as a great wonder. Today we find horses trotting in 2.10 and 2.15 at some of our country fairs. What has brought about this wonderful change? It is due to specializing in breeding. Do you suppose for a moment that by crossing Percheron, Clydes and Shires, we could have produced our Dan Patch, Lou Dillon, Nancy Hanks, and many others? It is said that Dan Patch eats four quarts of oats three times a day in connection with our other foods and paces a mile in 1.55 $\frac{1}{4}$. You might feed most any of your horses four bushels of oats per day and they could not pace a mile in two minutes, as they have not been bred along these lines. The United States leads the world in the number of fast trotting horses and there is no reason why we should not do the same with dairy stock, if the same care is exercised in selecting and breeding.

A Guernsey cow in Wisconsin has produced over 1000 pounds of butter during the past year. This shows what can be

done by special breeding. I do not mean by this that everybody should invest in thoroughbred stock when building up a herd, as this is a luxury usually intended for the rich, or men who have special means of advertising. Where a full blooded sire is used with a grade, the first cross is more than a half, the second cross would be 75 percent, and the third $87\frac{1}{2}$ percent, and the fifth would certainly be a full blood. In selecting a sire, it is best to get one from a good milking strain; not only the parents but the grandparents should be considered.

There has been a lot of discussion in late years about the merits of the so-called dual purpose cow and the special dairy type. My state is one of the strongest dual purpose cow states in the Union. This is due to the fact that corn is our principal crop, consequently beef production is a very essential thing. Notwithstanding that we make more butter than any state in the Union, dairying has been carried on somewhat as a side issue. So the cow that raises a good calf and gives a large flow of milk is the one most favored by the majority of our farmers. The whole question of dual purpose and special dairy type depends on locality. The dairy breeds are more popular in our state now than they have been for ten years. I presume the reason is that many persons trying to breed the so-called dual purpose cow have produced animals that did not belong to either type. There is possibly more money to be made in exclusive dairying than in any other agricultural pursuit, but every man is not intended for a dairyman. The man who makes a success in any line of work must have a liking for his business.

Two years ago I visited the famous herd of Jerseys owned by Mr. Ladd, the multi-millionaire of Portland, Oregon. Three of his cows were leaders at the World's Fair. It is Mr. Ladd's ambition to own the best herd of dairy cattle in the world. I had the pleasure of visiting his estate and herds, accompanied by himself. He has about 100 Jersey and Guernsey cows, mostly of the former breed. What surprised me the most was the detailed record kept of every cow, and the general knowledge that Mr. Ladd possessed concerning each individual cow, notwithstanding his busy life as a successful banker. He keeps in close touch with every detail of the farm. When walking up and down the aisles of his magnificent dairy barn, he gave me a detailed record of each cow from memory. Hence I was not surprised to see Ladd's herd come to the front at St. Louis, as he is thoroughly in love with his business.

I have not time to take up the question of feeding, but I will give you the method pursued by one of the most successful, practical dairymen in our state. I refer to Ex-State Dairy Commissioner Norton of Cresco, Ia. He does not select any one

special breed of cattle. He had a herd of 30 cows that made on an average 380 pounds of butter per cow for the year. They were of many breeds, but all had dairy characteristics. Mr. Norton started in the dairy business 25 or 30 years ago, with two cows and 40 acres of land. Today he owns the finest home in his county, and possibly the best barn of any man in our State. In connection with this, he owns hundreds of acres of our best land. His barns and house have electric lights and his separator and churn are run by an electric motor. He was one of the first men in our State to use a hand separator. He manufactures his own butter and has a special market for it. He endeavors to raise all his calves, which later on he sells for veal, therefore his skim milk nets him 25 or 30 cents per hundred. He has his cows calve in the fall as much as possible and he is a strong believer in protecting them from inclement weather. They are even watered in the barn. In fact, he is a believer in forcing a cow to drink more water than she really cares for. After the cows drink all they want, he mixes grain feed with the water in bottom of boxes. He thoroughly believes that a milch cow, to do her best, should be in such good condition that she can be sold to the butcher at any time for beef.

His principal feeds are ground corn, bran, clover hay and silage when he can get them. He regulates the quantity according to his judgment of the needs of each individual cow, feeding as near a balanced ration as possible. Mr. Norton tells this story: "Two years ago, when building his magnificent barn, a farmer owed him \$2500 which he had promised to pay at that time, but was unable to do so, Mr. Norton had to borrow that amount of money from the local bank. This he has paid off from the proceeds of the dairy and farm; but the other farmer who did not have time to milk cows has not been able to make his payment yet." Now what Mr. Norton has done is possible for others to do.

When cows are on grass during the month of June or the latter part of May, there is never any question about dairying paying, because they have an abundance of succulent food, or what might be termed a balanced ration in the grass they eat. Silage fed during the winter months approaches nearer grass or summer conditions than most any other feed owing to its succulent nature. For this reason, if no other, a good silo should be found on every well regulated farm. It is true that we have many cows that give a large flow of milk for a short period. This kind of a cow is not profitable and is likely to deceive the owner, as a dairyman usually remembers her as she is at her best. When a monthly test or yearly record is kept of individual cows, no such difficulty is experienced. Undoubtedly we have

hundreds of cows in the country that are not producing more than half or two-thirds what they should, owing to lack of proper treatment. All animals, man included, will sooner or later adjust themselves to their environment. We have hundreds of bright boys and girls in our cities, mere waifs, who under different surroundings would make useful citizens.

A few years ago when visiting the Isle of Man, that rocky little country surrounded by the sea, I was forcibly reminded of the effects of environment on animals. The sheep in that place were not more than one-third as large as they are here. Grass was very scarce and the little sheep seemed to be especially adapted for climbing over the rocks and hunting their living. The same is true of stock of any kind. Some of our finest breeds would not retain their characteristics long if not properly housed and if compelled to seek their own living.

When visiting some of the leading dairy farms in various parts of this and other countries, and studying their methods of feeding, I have come to the conclusion that the average dairyman does not feed his cows enough. It takes 60 percent to sustain animal life and we get our profits from the extra 40 percent fed. Irregular feeding and cold barns are serious drawbacks. Turning cows out to drink ice cold water is not conducive to profitable dairying, as it takes extra feed to supply energy and keep up animal heat. Care for the cow well, and she will care for you.

It is not always the man who has the best cows that makes the greatest success of dairying. Neither is it the man with the best gun that always does the best shooting. There are two essential qualities necessary for both. A good marksman must have a well trained eye and good nerve, while the successful dairyman must have a good knowledge of dairying and enough energy to apply that knowledge. So it is largely a question of the man behind the gun in both cases.

I have a German friend who is a noted violin player. A few years ago when travelling through Germany, he had occasion to call on an old farmer and his son. They had an old violin on which they were trying to play. My friend took the violin and tuned it up, as only an expert can, then played a few selections, when the old German exclaimed, "By Gimmine, that violin is worth twice as much as I thought it was." This applies to many farmers who part with excellent cows and only realize their value after they have disposed of them and some other man has developed them. Then they feel like the little boy who had constructed a large mud man. He had completed everything to his satisfaction (save that one arm was not on yet, and the head was not rounded into shape, but looked flat),

when his parents insisted that he come in to dinner. Some wag came along while he was absent and picked up the mud man and threw it into the pond where it disappeared. When the boy came out after dinner his mud man was gone, leaving nothing but a few tracks. Some days after this, the boy attended a sale with his father, and there, to his surprise, he saw a little short, flat headed man with one arm. He followed this man around from place to place. Finally the man turned and asked him what he wanted. The boy said "Oh, nothing." But the boy persisted in following the man, and finally the man turned around greatly annoyed and said "What do you want?" The boy replied "Why did you go away before I finished you?"

In conclusion I must say "Care for your cows well and they will care for you."

THE NEXT IMPORTANT STEP.

ED. H. WEBSTER, CHIEF DAIRY DIVISION U. S. DEPARTMENT OF
AGRICULTURE, WASHINGTON, D. C.

It is with a great deal of pleasure that I meet for the first time with the Vermont dairymen in their annual association meeting. This association ranks among the very best of similar associations throughout the country, and you have won a reputation for earnestness and good work that has extended far beyond the borders of your State. The evidence of so many farmers present at this meeting shows that this reputation has not been gained without an effort being put forth to make this the best association among dairymen in this country.

The purpose of my coming here is to speak to you for a few minutes along the line of improvement in Vermont. While Vermont stands at the head, so far as the production per cow goes, of any State in this Union, when we look at the figures and compare them with what might be done I think that even Vermont dairymen must feel that there is much yet to be done to raise the general level of production per cow to where it should be.

The work of your Professor Hills has been notable in the study of dairy cows and the production of dairy products, and I presume that a large percentage of the good work done in this State has been through his initiative. He has urged the dairy farmers to secure better stock, to use better methods in breeding and feeding and has always stood for advancement along dairy lines; and the fact that the average production in this State is 175 pounds butter per year per cow, as compared with 125 for the whole United States, shows actual results in the efforts that have been put forth. The experiment Stations and workers in these institutions throughout the country have all been doing much towards the advancement of dairying, but a great proportion of the effort has been spent on the manufacturing side of the dairy industry rather than on the production. I feel that not enough work has been done to encourage the farmer to produce more and better milk, to breed better stock, and to grow cheaper feeds for the production of milk on his own farm; and I verily believe that the next step in advance is going to be to organize the farmers into societies or associations for mutual help along these lines.

The way has been pointed out. We know that individual cows differ materially in the amount of product we get from them; we know that under different conditions many of our cows would do much better than they do at present; and yet we fail to apply these facts to our own individual farm practice. The Experiment Stations have published bulletins setting forth all of these facts. The dairy press has, through its wide reach of the dairy farmers, a thousand times brought forth these facts to the dairymen, and yet they fail to act. The probable cause of this failure must be sought and a remedy applied that will bring about a different state of affairs. The dairy farmer is a busy man, who has many things to attend to. He knows that he ought to keep records of his individual cows, that he ought to study breeding and feeding more than he does and apply the facts to his individual herd, yet he feels that these things take time, and time is one of the most precious things on the dairy farm. There is also in many quarters a failure to appreciate that the facts set forth in our dairy literature apply in the individual cases.

It was a study of these conditions that, a few years ago, caused a few farmers in Denmark to organize into what they have called their Test Associations. In these associations there is a community of interest. The facts that were known to these farmers before and unapplied, as they are today in our own country, were kept constantly before them by a man employed to visit the farms regularly and to point out where improvement could be made in feeding, to take records of the individual animals and to point out to their owner that this animal was profitable and that that one was unprofitable. From one organization, started but a few short years ago, this work has spread all over Denmark, northern Germany, through Holland and Belgium, over into Sweden and even into Russia. There are hundreds of organizations of this kind today in Europe which are doing a wonderful work in increasing the profitableness of dairying in the sections where they have been introduced. It is safe to say that in Denmark alone the net profits of the farmers have been increased fifty per cent inside of the last decade, by methods of this kind.

While in this country conditions are so different from what they appear abroad that it may not be possible or profitable to adopt their methods in this country, some adaptation of their principle of work can be applied to our conditions whereby the farmers may be brought together to study these questions and the community of interest encouraged, thus making it possible for those men who are busy with their own individual work to employ some one who can look after these details for them, that are now somewhat hazy and seem to be beyond their reach. The

dairymen of this association could take no greater step forward than at this time to encourage the organization of one or more such associations among its members. I believe that you ought to take steps now to get out literature that will teach the dairymen of your State the value of such work and that you ought to encourage your State legislature to aid you in lines of this kind. I am sure from what Professor Hills has told you of the conditions found in this State and of the work that has been accomplished already, that you can depend upon getting all the assistance he can possibly give in encouraging this work.

You have no more striking example of the need of work of this kind than the illustration given by Professor Hills in his description and explanation of the cow census as taken by Hoard's Dairyman. In this he has pointed out conditions that ought not to exist, and will not exist if the dairymen of this State take the forward step and will organize themselves in such a way that they can study questions that seem now beyond them, employ competent help for the cleaning out of the poor cows from their herds and have the aid of better methods of feeding and breeding.

I hope that this convention will not adjourn before steps have been taken in some way to start work along these lines. A committee should be appointed to make a thorough study of the application of the work that has been done abroad to your individual needs, and by the time of your next annual meeting you ought to be able to report such progress as will enable you to do a very materially advanced work in another year.

LICENSED OPERATORS OF THE BABCOCK TEST.

The following list shows the names, addresses and license numbers of parties who have been licensed between March 10, 1905, and April 30, 1906, in accordance with Section 2 of No. 81 of the Acts of 1898. The names, addresses and number of parties licensed prior to March 10, 1905, will be found in the 29th to 35th reports of this Association.

SECTION 2. Each and every person who, either for himself or in the employ of any other person, firm or corporation, manipulates the Babcock test, or any other test, whether mechanical or chemical, for the purpose of measuring the contents of the butter fat in milk or cream as a basis for apportioning the value of milk or cream, or the butter or cheese made from the same, shall secure a certificate from the superintendent of the dairy school of the University of Vermont and State Agricultural College that he or she is competent and well qualified to perform such work. The rules and regulations in the application for such certificate shall in no case exceed one dollar, the same to be paid by the applicant to the superintendent of the dairy school and be used by the superintendent in meeting the expenses incurred under this section.

NAME	P. O. ADDRESS	LICENSE No.
P. A. Atherton	Craftsbury	561
H. E. Austin	Shady Rill	531
Ralph A. Ayer	Underhill	559
N. J. Badger	Lyndonville	568
H. R. Barnes	Woodstock	541
Don H. Belknap	Cavendish	539
Frank A. Blake	Northfield	585
Eugene Boditte	Addison	535
A. E. Bryant	N. Berlin	527
E. O. Carpenter	Addison	560
Wm. D. Cillery	Barnet	558
Frank Chapman	Hinesburgh	576
Jas. R. Coamer	Pawlet	532
Alson N. Collins	Monkton	542
P. O. Eddy	Pittsford	565

Ollie B. Exley	E. Charleston	584
H. J. Flood	Plainfield	554
James C. Gibson	Ryegate	564
Frank N. Gould	Hartford	552
Fred Harvey	Monkton	557
J. F. Haynes	No. Hero	546
Dean J. Hill	Plainfield	586
Walter A. Hill	Tinmouth	540
Emmet Hosseltine	Norwich	544
Austin C. Huggins	So. Walden	533
Loun Jennings	Sharon	582
F. C. Johnson	Cloverdale	553
H. H. Johnson	Newbury	578
C. F. Kenyon	Bradford	555
G. L. Kinne	Charleston	534
C. H. Ladd	Franklin	572
George N. Lamphere	Fair Haven	529
Jas. A. Leonard	Shoreham	573
J. C. Leonard	Enosburg Falls	549
Frank E. Lewis	Norwich	566
Ernest H. Linden	E. Thetford	571
Oscar S. Loggin	Benson	543
C. M. Lothian	Swanton	548
John B. Lucia, Jr.	Middlebury	536
N. D. Marvin	St. Albans	583
D. H. McHugh	Weybridge	537
F. B. Morgan	Bethel or Barnard	547
Chas C. Morse	Randolph	580
Henry C. Noble	Tinmouth	567
Henry N. Paquette	N. Glover	577
Fred K. Phelps	Norwich	574
John E. Potter	Barnet	562
F. A. Rice	Berlin	530
C. B. Richardson	Newbury	551
Leon G. Rowen	Montgomery	556
E. M. Smith	Burke	563
Roy F. Stiles	N. Glover	538
Roy G. Stiles	Holland, Vt.	550
Mrs. Sarah E. Stone	Williamstown	528
Hordie E. Toof	Sheldon Junction	545
Horace B. Ward	No. Danville	579
Isaac B. Welch	Montpelier	581
H. A. Whitmore	Northfield	569
Bernie E. Wilson	Lowell	575
George Vincent	E. Berkshire	570

LIST OF CREAMERIES AND CHEESE FACTORIES IN VERMONT.

ADDISON COUNTY.

Weybridge	Reef Ridge Creamery Association
Salisbury	Lake Dunmore Creamery
Panton	Panton Co-operative Creamery
Panton	Elgin Spring Creamery Co.
Lincoln	Lincoln Co-operative Creamery
Bridport	Edward Nichols Creamery
Bridport	Edward Nichols Cheese Factory
South Starksboro, Green Mt.	Cold Spring Co-operative Creamery
New Haven	Beaver Glen Creamery
New Haven	Beaver Glen Cheese Factory
New Haven Mills	N. H. Mills Creamery
Orwell	Clover Leaf Creamery
Orwell	Orwell Cheese Factory Company
Middlebury	Middlebury Co-operative Creamery
Middlebury	Farmingdale Cheese Factory
Monkton	Donahue's Creamery

BENNINGTON COUNTY.

South Shaftsbury	Everest Brothers Creamery
Winhall	Green Mountain Cheese Association
Winhall	Branch of Mountain Lake Creamery
Readsboro	Elgin Creamery
Manchester	Battenkill Cheese Factory
Rupert	Cloverdale Cheese Factory
West Rupert	Rose Cheese Factory
Peru	Peru Cheese Company
Landgrove	Mountain Lake Creamery Station
Arlington	West Arlington Cheese Factory
Dorset	Dorset Cheese Association
Pownal	Pownal Valley Creamery

CALEDONIA COUNTY.

Walden	Noyesville Creamery
South Walden	Walden Creamery
East Hardwick	Lamoille Valley Creamery
East Peacham	East Peacham Creamery Co.
South Peacham	South Peacham Creamery Co.
Burke	Burke Creamery Co. (Incorporated.)
Barnet	Barnet Creamery Association
West Barnet	Mountain View Creamery
Sheffield	Sheffield Co-operative Creamery Association
Lyndonville	Lyndonville Creamery Association
Danville	Danville Creamery
North Danville	North Danville Co-operative Creamery

CHITTENDEN COUNTY.

Westford	Cloverdale Creamery
Westford Hollow	Donahue's Creamery
Williston	Williston Co-operative Creamery
Williston	Winooski Valley Creamery
Essex Junction	Wm. B. Johnson Creamery
Essex Junction	Donahue Brothers Creamery
Essex Center	Brown's River Creamery
Charlotte	Lake View Creamery
Charlotte	Deer Foot Creamery
Charlotte	Crystal Spring Creamery
Milton	Donahue's Creamery
West Milton	J. N. Ellis' Creamery
Milton	Milton Bow Cheese Factory
Jericho	Beaver Brook Creamery
Jericho	Standard Creamery Co.
Jericho	The Co-operative Creamery
Underhill	Underhill Co-operative Creamery
Underhill	Underhill Creamery
Huntington	J. W. Johnson Creamery
Huntington Center	G. M. Norton & Co. Creamery
Hinesburg	Chittenden County Creamery
Hinesburg	Valley Falls Creamery
Hinesburg	McDonough Cheese Factory
Richmond	Jonesville Creamery Association
Shelburne	Shelburne Co-operative Creamery

ESSEX COUNTY.

Lunenburg	Lunenburg Co-operative Creamery Association
Concord	Trout Brook Creamery Co.

FRANKLIN COUNTY.

Highgate	J. H. White & Son's Creamery
Bakersfield	Sunset Creamery
Sheldon	Capital Creamery
Sheldon	Eureka Creamery
Georgia	Standard Creamery Co.
Enosburg Falls	Enosburg Falls Creamery
Enosburg Falls	Owl's Head Creamery
Fairfax	Fairfax Creamery
West Berkshire	Clover Creamery Co.
East Berkshire	Marcey Creamery
East Berkshire	B. Combs Creamery
St. Albans City	Franklin Co. Creamery Company
Montgomery	Crystal Falls Creamery
Swanton	Franklin Co. Creamery Co.
Fletcher	Clover Leaf Creamery

GRAND ISLE COUNTY.

South Hero	South Hero Creamery Association
Grand Isle	Swanton Co-operative Creamery
Grand Isle	Grand Isle Co-operative Creamery
North Hero	North Hero Creamery Co.

LAMOILLE COUNTY.

Johnson	W. H. Stearns' Creamery
Elmore	Lake Elmore Creamery
Wolcott	Riverside Creamery
Stowe	Mt. Mansfield Creamery
Morrisville	Jackson Creamery Co.
Cambridge	Cambridge Creamery

ORANGE COUNTY.

Braintree	Snowsville Creamery
Randolph	Randolph Co-operative Creamery
North Randolph	North Randolph Co-operative Creamery
Randolph Center	Geo. H. Temple Creamery
North Thetford	North Thetford Creamery
East Thetford	Hood's Creamery
Bradford	Lyndonville Creamery Association
Fairlee	Hood's Creamery
Williamstown	Lyndonville Creamery Co.
Tunbridge	Tunbridge Creamery Association

Brookfield	C. Brigham & Co.
West Brookfield	Winchester Creamery Co.
Topsham	Co-operative Creamery Co.
West Topsham	Green Mt. Creamery Co.
Strafford	Strafford Creamery Co.
Corinth	Corinth Creamery Co.
East Corinth	East Corinth Creamery Co.
Washington	Washington Creamery Association

ORLEANS COUNTY.

Holland	Holland Creamery Co.
Evansville	Evansville Creamery
Charleston	Clyde River Creamery
Derby	The J. G. Trumbull Co. Creamery
Troy	Eureka Creamery Co.
Barton	Crystal Lake Creamery
Barton Landing	J. G. Trumbull Co. Creamery
Glover	Lyndonville Creamery Association
West Glover	Meadow Brook Creamery
Albany	J. G. Trumbull Co. Creamery
Newport	Eureka Creamery Co.
Newport Center	J. G. Trumbull Co. Creamery
Irassburgh	Jersey Star Creamery
Craftsbury	Black River Creamery
North Craftsbury	Mill Village Creamery
Coventry	J. G. Trumbull Co. Creamery
Greensboro	Caspian Lake Creamery

RUTLAND COUNTY.

Pittsford	Rutland County Creameries
Danby	The C. Brigham Co. Separator Plants
Chittenden	East Pittsford Cheese Factory
Hubbardton	Capitol Creamery
Hubbardton	"Gilt Edge" Cheese Factory
Shrewsbury	Gleason's Cheese Factory
Shrewsbury	Plumley's Cheese Factory
Shrewsbury	W. E. Aldrich's Cheese Factory
Mt. Holly	Tarbleville Cheese Factory
Mt. Holly	Mt. Holly Cheese Factory
Healdville	A. W. Cromley's Cheese Factory
Sudbury	Otter Creek Creamery
Proctor	Proctor Creamery
Poultney	Hudson Valley Creamery
Poultney	Borden's Condensed Milk Co.

East Poultney	East Poultney Cheese Factory
Benson	Benson Creamery
Benson	Maplehurst Creamery
Middletown Springs	Hudson Valley Creamery Co.
Middletown Springs	Chas. M. Bull Creamery Co.
Ira	Riverside Cheese Factory
Wells	Lewisville Cheese Factory
Wells	Eureka Cheese Factory
Rutland City	Rutland Creamery Co.
West Rutland	Smithtown Cheese Factory
Clarendon	Marshall Creamery, (P. O. North Clarendon)

WASHINGTON COUNTY.

Middlesex	Middlesex Creamery
Calais	East Calais Creamery Co.
Marshfield	Marshfield Co-operative Creamery Co.
Barre	Cobble Hill Creamery
Northfield	Wm. Mullen Creamery
Moretown	Cold Spring Creamery
Waitsfield	Mad River Valley Co-operative Creamery
Waterbury	Winooski Valley Creamery Association
Waterbury	E. R. Towne & Co. Creamery
Montpelier City	Crescent Creamery Co.
Montpelier City	Montpelier Creamery
Plainfield	Plainfield Co-operative Creamery
East Montpelier	East Montpelier Co-operative Creamery
North Montpelier	North Montpelier Co-operative Creamery
Cabot	Cabot Creamery Co.
Warren	Warren Co-operative Creamery Co.

WINDHAM COUNTY.

Newfane	Windham Co. Creamery Association
Putney	Putney Creamery
Westminster	Valley Creamery
Wilmington	Deerfield Valley Creamery Association
Brattleboro	Brattleboro Creamery Association
Wardsboro	Branch of Newfane Creamery
Londonderry	Londonderry Cheese Factory
South Londonderry	Mount Lake Creamery
Whitingham	North River Creamery Association
Dummerston	Dummerston Creamery

WINDSOR COUNTY.

Rochester	Standard Creamery Co.
Chester Depot	C. R. Hazen Creamery
Chester Depot	Chester Cheese Co.
Barnard	Silver Lake Creamery
East Barnard	Clover Valley Creamery
Norwich	H. P. Hood & Sons Creamery
Pomfret	Sherburne Creamery Prop.
Sharon	Sharon Co-operative Creamery
Cavendish	Fletcher Dairymen's Association
Bethel	Harrington Creamery
East Bethel	Storrs Creamery
Windsor	Hillside Creamery
Weston	Weston Cheese Factory
Plymouth	Plymouth Cheese Factory
South Reading	South Reading Cheese Factory
Woodstock	H. P. Hood & Sons Creameries
N. Pomfret	Cloudland Creamery
West Windsor	West Windsor Cheese Mfg. Co.
West Hartford	West Hartford Creamery Corporation
West Hartford	Howard's Creamery Prop.
Hartland	Hartland Creamery
Hartland Four Corners	Brookside
Royalton	S. & F. Creamery
S. Royalton	Richardson Creamery
North Pomfret	Grassland Stock Farm Creamery

THIRD ANNUAL REPORT

OF THE

Vermont State Horticultural Society

PROCEEDINGS

OF THE

Eleventh Annual Meeting,

HELD AT BURLINGTON,

DECEMBER 13, 14, 1905.

BURLINGTON:
FREE PRESS PRINTING CO.,
PRINTERS, BINDERS, STATIONERS.
1906.

LETTER OF TRANSMITTAL.

To His Excellency C. J. Bell, Governor of Vermont:

Dear Sir.—In accordance with the requirements of law, I have the honor to transmit to you the Third Annual Report of the Vermont State Horticultural Society.

Respectfully,

WILLIAM STUART,

Secretary.

OFFICERS

OF THE

VERMONT STATE HORTICULTURAL SOCIETY.

PRESIDENT.

E. S. BRIGHAM. St. Albans, Vt.

COUNTY VICE-PRESIDENTS.

Addison F E. FOOTE.
Bennington.....
Caledonia C. J. BELL.
Chittenden E. C. BROWN.
Franklin H. K. BROOKS.
Grand Isle A. H. HILL.
Lamoille GEO. H. TERRILL.
Orange DANA MORSE.
Orleans W. E. ROBINSON.
Rutland D. C. HICKS.
Washington S. S. BALLARD.
Windham A. A. HALLADAY.
Windsor GEO. W. PERRY.

SECRETARY.

WM. STUART.....Burlington, Vt.

TREASURER.

A. M. VAUGHAN Randolph, Vt.

AUDITOR.

T. L. KINNEY.....So. Hero, Vt.

CONSTITUTION
OF THE
VERMONT STATE HORTICULTURAL SOCIETY.

ARTICLE I.

Name—This Society shall be known as the Vermont State Horticultural Society.

ARTICLE II.

Object of the Society—The object of this Society shall be for the purpose of improving the condition of pomology and other branches of horticulture, and disseminating correct information concerning the culture of such fruits, flowers, trees, and other productions in horticulture as are adapted to the soil and climate of Vermont.

ARTICLE III.

Membership—Any person may become a member by paying the secretary or treasurer an annual fee of fifty cents or a life member upon the payment of five dollars.

Honorary members for a time stated or for life may be elected at any annual meeting by a two-thirds vote of the members present.

ARTICLE IV.

Officers—The officers of the Society shall consist of a president and one vice-president from each county of the State, a secretary and treasurer, an auditor, and an executive committee composed of the officers of the Society.

ARTICLE V.

Duties of the president and vice-presidents—It shall be the duty of the president to preside at and conduct all meetings of the Society, and deliver an annual address. In the absence of the president this duty shall devolve upon the vice-presidents in their order. It shall be the duty of the vice-presidents to

assume general supervision of the horticultural interests of their county, and shall make written report of the same to the Society at its annual winter meeting.

ARTICLE VI.

Duties of the secretary—The secretary shall record all the proceedings of the Society, collect and prepare all communications for the public press, and pay over all moneys received from members or otherwise to the treasurer on his receipt; receive and answer all communications addressed to the secretary, and as an executive officer, aid the president in the dispatch of business relating to the meetings of the Society.

ARTICLE VII.

Duties of the treasurer—The treasurer shall collect and hold all funds of the Society and pay out the same only on the order of the president, countersigned by the secretary. He shall make up a report of all the receipts and disbursements of the Society and present the same at the annual winter meeting or at any other time when called upon to do so by the executive committee. He shall give bonds in such sum as the Society may direct, to be approved by the president and secretary, and the bond when so approved shall be filed with the State Auditor.

ARTICLE VIII.

It shall be the duty of the auditor to examine the books of the treasurer and report same to the State Treasurer.

ARTICLE IX.

Election of officers—The officers of the Society shall be elected annually by separate ballot and shall hold their offices until their successors are elected.

ARTICLE X.

Meetings of the Society—The Society shall hold their annual sessions at such time and place as seems best to the executive committee.

ARTICLE XI.

Amendments—By-laws and alterations of the constitution may be enacted by a vote of two-thirds of the members present

at any regular annual meeting, one day's notice of the same being given.

Among the public acts passed by the 1904 General Assembly of the State of Vermont was one entitled "An act to promote the Horticultural interests of Vermont," which is as follows:—

No. 15.

AN ACT TO PROMOTE THE HORTICULTURAL
INTERESTS OF VERMONT

It is hereby enacted by the General Assembly of the State of Vermont:

Section 1. The sum of five hundred dollars (\$500.00) is hereby appropriated annually to the Vermont State Horticultural Society for the purpose of promoting, encouraging and developing the horticultural interests of the State.

Sec. 2. The auditor of accounts is hereby directed to draw an order on the State Treasurer in favor of the treasurer of the Vermont State Horticultural Society for the first payment of this appropriation on the second day of January 1905, and annually thereafter so long as the conditions hereinafter provided shall be complied with.

Sec. 3. Said Vermont State Horticultural Society shall hold an annual meeting, of at least two days' duration, at some town or city in the State which is easy of access to the people and in some convenient and suitable building. At said meeting men of horticultural note shall be engaged to teach and discuss the best methods of fruit, vegetable and flower culture, as well as the handling and marketing of the product. At the said annual meeting premiums not to exceed one hundred dollars shall be offered for the best exhibits of fruits, vegetables, and flowers, said premiums to be awarded by disinterested and expert judges, and paid by the treasurer of the Vermont State Horticultural Society.

Sec. 4. The secretary of the Vermont State Horticultural Society shall on or before December 1, 1905, and annually thereafter, make a detailed and itemized account to the state auditor of accounts of the receipts and expenses of said society which accounts shall be approved and countersigned by the treasurer and auditor of said society.

Sec. 5. If in any year it shall appear to the state auditor of accounts that any part of the preceding annual appropriation has been injudiciously expended, then such part or amount may be deducted from the order for the ensuing annual appropriation.

Sec. 6. The report of the annual meeting of the Vermont State Horticultural Society shall be published by the State Board of Agriculture in their annual report as provided in section two hundred forty-seven of Vermont Statutes.

Sec. 7. This act shall take effect from its passage.

Approved December 9, 1904.

This act will enable the Society to provide more interesting meetings, by securing the best speakers available, and also insure the publication of its proceedings, thereby disseminating the knowledge brought together at these gatherings.

LIST OF MEMBERS

OF THE

VERMONT STATE HORTICULTURAL SOCIETY

Aitken, George	Woodstock
Ballard, S. S.	Montpelier
Bell, Gov. C. J.	East Hardwick
Brigham, E. S.	St. Albans
Bristol, R. H.	Vergennes
Bristol, E. S.	Vergennes
Browne, E. C.	Burlington
Brooks, H. K.	Swanton, R. F. D.
Cady, C. G.	Middlebury
Cady, W. M.	Middlebury
Clough, G. A.	East Braintree
Craig, Wm.	Abbotsford, P. of Que.
Davis, L. L.	No. Pomfret
Dunsmore, G. H.	St. Albans Bay
Fay, P. J.	Shelburne Farms
Fisk, N. W.	Fisk
Foote, F. E.	Middlebury
Gage, Merlon P.	Greenport, (L. I.) N. Y.
Gordon, Edwin	Grand Isle

Gove, C. E.	Burlington
Halladay, A. A.	Bellows Falls
Hemenway, R. L.	Bridport
Hewitt, H. H.	Bristol
Hicks, D. C.	No. Clarendon
Hill, A. H.	Isle La Motte
Hills, Prof. J. L.	Burlington
Hitchcock, E.	Pittsford
Horsford, F. H.	Charlotte
Holcomb, W. E.	Burlington
Hunt, E. G.	New Haven
Ingalls, E. L.	Vergennes
Ingalls, Mrs. E. L.	Vergennes
Jacobs, H. B.	Vergennes
James, C. S.	Middlebury
Johnson, C. H.	Burlington
Jones, Prof. L. R.	Burlington
Kimball, G. F. O.	Vergennes
Kinney, T. L.	So. Hero
LePage, Mrs. Chas.	Barre
Miller, F. H.	Halifax
Miller, Arthur L.	East Dummerston
Miller, J. A.	East Dummerston
Morse, D. H.	Randolph
Munson, Prof. W. M.	Orono, Me.
Perry, G. W.	Chester Depot
Putnam, Luther	Cambridge
Richards, W. N.	Vergennes
Robinson, Mrs. R. E.	Ferrisburgh
Robinson, W. E.	Newport
Robinson, Mrs. W. E.	Newport
Sheldon, L. H.	Fair Haven
Small, F. M.	Morrisville
Smith, C. F.	Morrisville
Smith, S. W.	Addison
Stevens, J. McLean	Orwell
Stuart, Wm.	Burlington
Sumner, Chas. D.	Middlebury
Talcott, L. H.	Williston
Terrill, G. H.	Morrisville
Thomas, G. F.	Addison, R. F. D.
Thomas, J. C.	Vergennes
Totman, H. M.	Randolph
Tracy, W. W.	Dept. Agr., Washington, D. C.
Vaughan, A. M.	Randolph
Waugh, F. A.	Amherst, Mass.

Weeks, W. F.	Shelburne
Whitford, L. G.	Vergennes
Whitney, S. B.	Enosburgh Falls
Wood, Dr. H. W.	St. Johns, P. of Que.
Wright, E. L.	Middlebury

WEDNESDAY AFTERNOON, TWO O'CLOCK.

ADDRESS OF WELCOME.

J. E. BURKE, MAYOR OF BURLINGTON.

Ladies and Gentlemen, Members of the State Horticultural Society:

In behalf of the citizens of Burlington I extend to you a hearty greeting, and welcome you to our hospitable city.

This is an age of progress and we believe in progress all along the line. Now the question is how are we going to arrive at the desired result? You have organized for a most desirable purpose, there is no question about that. We all know the principal industry of the State of Vermont is agriculture; the large majority of the people of the State of Vermont are engaged in agricultural pursuits.

In the State of Iowa you know the majority of the people are engaged in the raising of corn; I believe they plant in the neighborhood of nine millions of acres each year. They raise about 300,000,000 bushels of corn, but they found that during the last few years the yield showed a falling off. You see the people there are interested in the same things we are here in Vermont, and they have taken the matter up and have investigated it. Professor Holden of the State Agricultural College in Iowa has made a study of the question, and he has come to the conclusion that the reason there was such a falling off in their yield per acre of corn was owing to inefficiency in planting and the use of inferior seed. The result of his investigation interested the Agricultural Department of the U. S. Government and also the Agricultural Department of the State of Iowa, and they decided the only way in which they could remedy the trouble and produce the results desired was to get in closer touch with

the people by meeting them face to face. The result was that they made arrangements with the railroad authorities in Iowa to run a seed special. A train was made up of three or four cars in which to travel about the state; the matter was thoroughly advertised and this train traversed the whole state; they gave as many as ten and twelve lectures a day; sometimes there were three lectures going on at the same time and in the majority of cases the towns being small the lectures were given in the cars, and I understand the average attendance at these lectures was 190 odd. It was a continuous performance all the way along; now they are awaiting the result.

This raised a question in my mind, whether I would not have a right from this platform to try and offer a suggestion in regard to the workings of this Society, which I think would produce better results. You all know that next month the State Dairymen's Association and the Vermont Sugar Makers will hold a joint meeting in Burlington. The object of the Horticultural, the Dairymen and Sugar Makers' Societies are identical. Now I ask you why it wouldn't be better for you three to join hands and hold your meetings together? I think if such an understanding was arrived at for the next year's meeting it would be to the benefit of all three societies and the good of the State of Vermont. Better results would be obtained, simply because you would be able to have larger attendance—more people to hear the good things said. You know there is a satisfaction in doing business with a person when you can get in close touch with him, get where you can ask each other questions.

I wish you to take to yourselves what I have said for what it is worth. I am not an agriculturist and not a horticulturist, yet I am interested thoroughly in everything that pertains to the welfare of the State of Vermont. I am a Vermonter through and through. I believe there is no body of men in the State of Vermont that can do as much good and do more to build up the State than the farmers,—because they are, strictly speaking,—the people of Vermont. I thank you for your attention.

RESPONSE BY THE PRESIDENT.

I wish to convey to you, Mr. Mayor, and the people of Burlington, the greeting of the Vermont State Horticultural Society and thank you for the welcome you have extended to us.

It is a well known fact that no man is any longer independent of any other man; labor is dependent upon capital, capital upon labor, and their interests are and should be identical. In like manner the city is dependent upon the country and the country on the city, and their interests are identical. As citizens of Vermont we are proud of Burlington, we are proud of her industries; proud of her culture and social life. In like manner I believe the people of Vermont are interested in every movement to promote the welfare of Vermont and also interested in this Society, which has as its object, the promotion of the horticultural interests of the state.

A most cordial invitation is given to all those persons who are directly or indirectly interested in the cultivation of fruits, flowers and vegetables, to attend these meetings.

REPORT OF SECRETARY.

The following report on the condition of the Society is respectfully submitted.

Since the last annual meeting of the Society a report of its proceedings has been published, entitled the Second Annual Report of the Vermont State Horticultural Society. Five hundred copies of this report were printed in order to ensure a reasonable supply for future demands of the members of the Society.¹ During the year membership fees amounting to twenty-seven dollars and fifty cents have been received and turned over to the treasurer. Although there was a considerable increase in membership during the current year, there are still great opportunities for enlarging our list of active members. Your secretary would respectfully invite each member to aid in securing new members and thereby widen the influence of the Society.

A well attended executive committee meeting was held on November 8, at the Agricultural Experiment Station, for the purpose of deciding date and place of holding present meeting and for the discussion of other matters pertaining to the welfare of the Society. Those present at this meeting were E. S.

¹ The Proceedings are also to be published in the Report of the State Board of Agriculture, which includes a much larger edition and insures a still wider circulation.

Brigham, A. M. Vaughan, Dana H. Morse, S. S. Ballard, W. E. Robinson, D. C. Hicks, A. H. Hill, G. H. Terrill, H. K. Brooks, Geo. W. Perry, E. C. Brown, F. E. Foote, and W. Stuart.

With reference to the operation of Act 15 of the laws of Vermont for 1904, by which the Society receives an annual appropriation from the state of five hundred dollars (\$500.00), we would like to direct your attention to section 4 of this act, which we think ought to be slightly modified. It would seem desirable to the secretary to have section 4 changed so as to read: "The treasurer of the Vermont State Horticultural Society shall on or before January 1, 1906, and annually thereafter, make a detailed and itemized account to the state auditor of accounts of the receipts and expenses of said society which accounts shall be approved and countersigned by the secretary and auditor of said Society."

By changing the date of making report from December 1st to January 1st it would enable the treasurer to include expenditures of the December meeting, which under present construction of the act it is impossible to do.

An opportunity has recently presented itself by which the Society at comparatively slight expense might indirectly exercise some supervision over the once celebrated orchard of the late Dr. T. H. Hoskins of Newport, Vt. When it is remembered that this orchard at one time contained one of the best collections of hardy apples in northern New England, such an opportunity as now presents itself of advising with the present owner regarding the best means of caring for these fruits and of obtaining notes upon the behavior of the different varieties, it would seem that the Society could well afford to delegate one or more of its members to look after this matter.

Respectfully submitted,

W. STUART,
Secretary.

TREASURER'S REPORT.

EXPENDITURES OF THE VERMONT STATE HORTICULTURAL SOCIETY FROM JANUARY 3 TO DECEMBER 1, 1905.

1905.

Jan. 13—By warrant No. 2, to F. L. Lane & Co., for printing posters	\$ 2 75
Jan. 31—By warrant No. 3, to F. L. Lane & Co., envelopes and programs	6 90

Feb. 9—By warrant No. 4, to Miss Chase for clerical services	7 50
Feb. 9—By warrant No. 5, to Wm. Stuart for trip to Vergennes, postage, telephone, etc	12 50
Feb. 10—By warrant No. 6, to T. L. Kinney for premiums	17 50
Feb. 11—By warrant No. 7, to Mrs. R. E. Robinson for premiums	1 00
Feb. 11—By warrant No. 8, to F. H. Miller for premiums	2 00
Feb. 10—By warrant No. 9, to E. S. Bristol for premiums	11 00
Feb. 10—By warrant No. 10, to Luther Putnam, for premiums	8 50
Feb. 10—By warrant No. 11, to F. R. Foote, for premiums	4 50
Feb. 10—By warrant No. 12, to L. G. Whitford for premiums	5 00
Feb. 10—By warrant No. 13, to S. W. Smith for premiums	6 00
Feb. 10—By warrant No. 14, to R. H. Bristol, for premiums	2 00
Feb. 10—By warrant No. 15, to G. H. Terrill for premiums	2 00
Feb. 10—By warrant No. 16, to G. E. Hunt for travel and hotel expenses	2 30
Feb. 13—By warrant No. 17, to Mrs. M. A. Smith for travel and hotel expenses	3 28
Feb. 15—By warrant No. 18, to Prof. L. H. Bailey for travel and hotel expenses	27 57
Feb. 14—By warrant No. 19, to A. M. Vaughan for travel and hotel expenses	6 90
Feb. 10—By warrant No. 20, to T. L. Kinney for travel and hotel expenses	3 41
Feb. 10—By warrant No. 21, to J. W. Ryan for rent for City Hall	10 00
Feb. 10—By warrant No. 22, to W. E. Craig for hotel bill	2 50
Feb. 10—By warrant No. 23, to S. S. Gaines for hotel bill Mrs. M. Smith	2 25
Feb. 10—By warrant No. 24, to S. S. Gaines for hotel bill Miss G. S. Smith	4 25
Feb. 15—By warrant No. 25, to W. Stuart for travel, hotel and sundry expenses	3 45
Feb. 15—By warrant No. 26, to H. W. Heath for travel, hotel and readings	6 30
Feb. 15—By warrant No. 27, to L. R. Jones for travel and hotel expenses	1 49

Feb. 11—By warrant No. 28, to F. A. Waugh for travel and hotel expenses	15 00
Feb. 15—By warrant No. 29, to W. T. Macoun for travel and hotel expenses.....	14 85
Feb. 27—By warrant No. 30, to G. H. Terrill for travel, hotel and postage	7 20
Feb. 10—By warrant No. 31, to G. W. Perry for travel and hotel expenses	7 40
Feb. 10—By warrant No. 32, to Mrs. E. W. LePage for travel and hotel expenses	5 50
Feb. 10—By warrant No. 33, to L. H. Sheldon for travel and hotel expenses	5 24
Feb. 15—By warrant No. 34, to F. L. Lane & Co., for receipt and bill books	4 00
Apr. 10—By warrant No. 35, to Miss Chase for clerical services	1 05
Apr. 26—By warrant No. 36, to Miss G. S. Smith for stenographic report of meeting	33 11
July 8—By warrant No. 37, to Miss Chase for clerical services	1 65
Oct. 12—By warrant No. 38, to G. W. Perry for engraving	1 25
Aug. 24—By warrant No. 39, to Springfield Photo. Eng. Co., for half tone plate	2 81
Sept. 1—By warrant No. 40, to Free Press Ass'n., 1000 letter heads	3 50
Oct. 12—By warrant No. 40, to W. Stuart for express and postage	5 04
Oct. 1—By warrant No. 41, to Free Press Ass'n., for 500 separates Vt. State Hort. Repts. and 500 catalogue envelopes	23 75
Nov. 8—By warrant No. 42, to A. M. Vaughan for travel and hotel expenses	3 84
Nov 8—By warrant No. 43, to D. H. Morse for travel and hotel expenses	4 36
Nov. 10—By warrant No. 44, to A. H. Hill for travel and hotel expenses	4 30
Nov. 9—By warrant No. 45, to G. W. Perry for travel and hotel expenses	6 24
Nov. 15—By warrant No. 46, to E. A. Brigham for travel and hotel expenses	2 38
Nov. 16—By warrant No. 47, to F. E. Foote for travel and hotel expenses	2 60
Nov. 16—By warrant No. 48, to W. E. Robinson for travel and hotel expenses	6 60

Nov. 31—By warrant No. 50, to Burlington Printing and Bookbinding Co.	1 25
Nov. 8—By warrant No. 51, to H. K. Brooks for travel and hotel expenses	4 28
Nov. 8—By warrant No. 52, to S. S. Ballard for travel and hotel expenses	3 64
By Warrant No. 53, to W. Stuart, salary.....	50 00
Nov. 8—By warrant No. D. C. Hicks for travel and hotel expenses	5 65
	\$389 34
Cash on hand	138 16
	\$527 50

RECEIPTS OF VERMONT STATE HORTICULTURAL SOCIETY FOR 1905.

Feb. 9—By balance	\$500 00
Feb. 15—By dues	19 00
Nov. 8—By dues	8 50
	\$527 50

Respectfully submitted,
A. M. VAUGHAN,
Treasurer.

REPORT OF COUNTY VICE-PRESIDENTS.

A. H. HILL, GRAND ISLE COUNTY.

There has been a great neglect of spraying in our county this last year, I am sorry to say, and among farmers, too, who have had the benefit of the experiments here at the Experiment Station, and the experiments that have been conducted in the different towns, and I have come to the conclusion that they think spraying doesn't pay. I think if they would take the pains to do a little spraying in their own individual orchards and on their own responsibility they would find that spraying *does* pay. I have noticed in two towns, especially, there has been backsliding in spraying, and now I can see the effects of it. There has been neglect of some of the older trees in my town and county; there are lots of old orchards that are neglected; with proper cultiva-

tion of the soil, fertilization and spraying, these orchards would be as productive and more so than 25 or 30 years ago. It is not right that a number of old orchards should be so neglected and simply left to breed diseases and insect pests. I am sure the quality and quantity of the product of fruit in Grand Isle County could be more than doubled if the old orchards were taken better care of. Notwithstanding this neglect on the part of the farmers, the total output this season, being an off year, is creditable. There were shipped, as nearly as I can find out, from the three or four towns in the county from 27,000 to 30,000 barrels of apples, mostly to the New York and Boston markets. Isle La Motte turned out 10,000 barrels; Alburg 2000; 1000 to 1200 were shipped from North Hero and 1500 from South Hero, including Grand Isle; prices have ranged from \$1.50 to \$5.50 a barrel. I find a tendency among the farmers to grow too many kinds of apples, too many sorts. In loading one car of apples that I bought in North Hero I had something like 28 or 30 varieties in that one car. Now, too many of those varieties were of the \$1.50 kinds. If they had all been Spies they might have been worth \$5.50.

We have one of the finest markets in the country; buyers come here along this Champlain valley from all sections of the country; we don't have to seek the buyers, they seek us, and I am surprised that with a market right here at our very doors there are so many farmers that can't see it is for their best interests to set out a few more apple trees and take better care of what they already have.

MR. KINNEY.

Our report from Grand Isle County speaks of spraying and of backsliding from its use. I would like to correct that. I don't think, from my observation, that spraying of Grand Isle orchards is on the downward road; I don't think we are backsliding at all. I think it is one of the most important matters we can discuss and that we are continuing along the line. Some of the best spraying apparatus has been purchased in Grand Isle County and used. We gave our attention a few years ago to spraying for the apple scab and it accomplished the desired results for that trouble, and then the Lord seemed to step in and help us out with atmospheric conditions so there was no more apple scab in our county, and our apples were clean again. Those of us who sprayed so thoroughly for the apple scab have not given it up but there is not as much of it done for that purpose as before. I think next year there will be more spraying done in Grand Isle County than ever before;

we are not slipping back, but the fact of our not having sprayed as much for the apple scab, the insects have made greater progress than we are aware of. The gentleman from Isle La Motte is right in urging the importance of more spraying and I hope the farmers will take the matter up.

F. E. FOOTE, ADDISON COUNTY.

Addison County brings greetings to the State Horticultural Society convened. We believe that it is the best organization in existence to-day and will do the greatest amount of good to the horticultural interests of our state. Our Society is yet but in its infancy, with bright prospects for the future. We have had the opportunity of putting into practice the lessons that we have learned in the past gatherings; and are here to-day to get new ideas for further development in the line of horticulture, which is one of the nicest branches of agriculture and an industry which I thoroughly believe will be in the near future one of the greatest sources of revenue to the farmer. We have the soil and the climate to grow fruit that can be excelled by no other place in the world. We have the knowledge and the enterprise to compete with any class of people. Are we to shut our eyes against this important industry? I will answer No. Vermont never has taken a back seat in anything that we undertook to do. All things being considered, so long as we are raising the nicest fruit that the city market affords to-day, we are going to keep right on in this line; only we are going to try and beat ourselves in the future in the things that we have done in the past. Addison County this year alone has shipped in round numbers 45,000 barrels of apples, which have netted the farmers \$120,000, an amount which I believe in the next ten years will be doubled.

The prevailing high prices the last autumn have given a new impetus to the fruit grower, and next spring we shall see him planting new trees, pruning his old orchards and caring for them as never before.

We are told that history repeats itself; so do the high prices of apples often prevail, as four years ago apples were even higher than this past year. The average price paid the farmer for his apples for the last five years has been about \$2 per barrel for No. 1 apples of good varieties. Now, figuring on the basis of what one of our Grand Isle County speakers told us

one year ago: that the first cost of a barrel of apples to the grower was \$1, the apple industry has paid the grower 100% on money and labor invested. Tell me of any business in this county that pays 100% profit outside of growing fruit, and every American will be as eager to get stock as the gold seekers were to reach California in 1848.

Brothers in Horticulture there never was a better time to grasp this industry than now. We must educate ourselves in the most up-to-date and practical methods of deriving the best results in raising fruit. The time has passed when we can plant a potato in early springtime and reap a harvest in the autumn without labor and expense. In the same degree we cannot expect fruit from a tree that we have simply set out ten years ago without any care or expense. This is an age when we have got to fight—all kinds of insects and fungous diseases—in order to grow perfect fruit.

The oyster-shell bark-louse is an insect that has lately made its appearance in our vicinity in such large numbers that unless we are able to exterminate it altogether I fear that we will practically lose many of our best orchards.

Market gardening in our county is hardly practical to but a very few on account of the limited demand for the products and the distance from the large centers that consume the vegetables.

Potato culture in many of our mountainous towns, where apples do not thrive well, is quite extensively carried on and this year will net the growers a good many thousand dollars, although but few of the growers raise over 800 bushels, nearly all of the farmers in the county make it a source of a good annual revenue, which furnishes them ready means for better schools, more comforts of life, less farm mortgages and happier homes. The past season being such a wet one, many of the potato fields have been totally destroyed by rot and, in many cases, very discouraging results have followed: but "we are not here to-day to bury Cæsar, but to praise him," and our fields this year that have been barren of sound potatoes next season may reward the grower two hundred fold.

Our apple trees that were destitute of the luscious fruit this season were building up tissue and fiber and blossom buds for next season's bountiful harvest—and let us all be ready in the early springtime to grasp the industry in an intelligent, thorough, and business-like way that will give us better results than we have ever yet received.

D. C. HICKS OF RUTLAND COUNTY.

Conditions in this county for the year of 1905 have been somewhat variable; in some localities a fair fruit crop has been harvested, and the same may be said of the garden and field products, but as a whole, such crops are not up to a ten years' average in quantity or quality.

Apples—Apples, especially winter fruit, of good marketable quality, are estimated at not over 40% of last season's crop. Local markets have taken nearly all that have been offered for sale; only a few carload lots have been shipped to southern New England markets. Prices ranged from \$2.50 to \$4.00 per bbl.

Pears—Next to apples, pears are of the most importance of the orchard fruits. The crop was up to a ten years' average in the amount of fruit on the trees, but the quality was exceedingly poor; less than 50% being marketable. The fruit, in nearly all cases, was under size, deficient in color and in some varieties scabby and blotchy skin were very prevalent. Anjou and Eastern Belle are two varieties that gave me some perfect fruit. Retail prices were 25c to 40c per peck and \$2 to \$3.50 per bbl.

Plums—The plum crop early in the season promised good returns, but the destructive work of heavy wind storms at the ripening period followed by the brown rot reduced the crop very materially, so that the marketed crop was a small average one, that brought good prices at retail, \$1.25 to \$1.75 per bushel.

Cherry—This fruit is very sparingly grown in Rutland county, yet it is as easily grown as any of the other tree fruits and the demand in our local markets always exceeds the supply, keeping the birds away from the orchard and the trouble of securing good pickers are the greatest obstacles to be overcome; the last named may be greatly aided by the use of the recently perfected cherry clipper, which gets the fruit from the tree without handling and lessens the liability to injury of the ripened fruit, and fruit stems and spurs. In my immediate locality the crop of early cherries was light and was largely picked by the birds. The later ones gave better returns; wholesale price \$3.00 per bushel.

Small Fruits—Small fruits are not largely cultivated in any one section of the county, but in recent years the best plantations are found growing upon the slate and light loam soils of the west part of the county. Strawberries, raspberries, blackberries and currants were in short supply and were below an average in quality, lack of sunshine and heavy rains at picking

time were contributing causes. Prices were satisfactory to the growers.

Vegetables—Garden crops, I think, were well up to an average with the exception of early potatoes, which dug a very light crop. Gardeners report prices well sustained throughout the season and surplus stock well sold up. The potato crop is one of the short crops of the season, and eating stock is now selling at wholesale at 75c per bushel, with every prospect of higher prices in the near future. Well ripened, free from disease, seed stock will have a quick sale next spring at good prices.

Spraying—Spraying of orchard and field crops is now more largely a practice than a few years ago. It has become recognized by the best farmers that, as a factor in growing paying crops, it must not be neglected. Spraying with liquids is the general practice, although the dust spray is used in a limited way upon potatoes and small fruits.

Fruit Sections—The best fruit lands of the county are in the west, central and northern towns, the eastern tier of towns are at too high an altitude, located as they are high up upon the main range of the Green Mountains. There is a wide variation in the character of our soils, a strip of light sandy soil extends the entire length of the county on the east, adjacent to the mountain range, in the north northwest portions, heavy clay and clay loams predominate; in the southwest we have light and heavy slate soils and in the south central section, lime enters largely into the composition of its soils. Under the right conditions all of these soils make good fruit lands; the heavy soils need drainage and all thorough cultivation. Slope and altitude are important factors in the location of our orchards. In our section of the Champlain Valley the most reliable bearing orchards are at slight elevations above the Otter Creek and tributary valleys; I should say from 200 to 600 feet.

The finest apples shipped from my section of the county were grown in an orchard located at an elevation of 1000 feet above sea level.

Varieties—The two best winter apples for market are Northern Spy and Rhode Island Greening; they succeed generally throughout the county. Baldwin is less successful.

In pears, I consider that Anjou leads; and in cherries Montmorency.

A few of the recently introduced varieties of fruits that I consider worthy of further trial, I herewith mention: Walter Pease, Scarlet Pippin, Ontario, Jacob Sweet, Quebec Sweet and Milding Apples; Columbia, Worden Seckle, Rossney, Eastern Belle and Grand Isle Pears; Olivet, Ostheimer and Baldwin

Cherries; Tennant and Giant Prunes, and Diamond and Monarch Plums.

In Raspberries, Cardinal, Haymaker, Ruby and King from a one year's fruiting seem to have some merit; Eldorado and Agawam are reliable Blackberries with me.

In Currants Wilder and Fay for red and White Grape for white please me.

The above incomplete report is respectfully submitted.

G. H. TERRILL, LAMOILLE COUNTY.

The fruit crop for this county was small as compared with last year, still there was a fair crop of small fruit and also of apples and plums. Plums were a very good crop this year. Apples were of good quality and a good price has been the result. Owing to the wet weather, I think, apples have not kept as well as usual. The mice made bad work with many orchards last winter. New trees have been set in some instances, and more will be needed to fill in where dead.

DEFINITENESS IN HORTICULTURE.

PROF. F. W. RANE OF DURHAM, N. H.

You all know that in any business we take hold of we generally make a success of it according to the amount of definiteness we put into it. That is the word I wish to impress upon your minds,—*definiteness*. Definiteness in agriculture, definiteness in horticulture, definiteness in every business.

With all due respect to your mayor, I don't believe we should join with other organizations; each New England state ought to have a good, rousing horticultural organization of its own. Definiteness is wanted. We don't want the man that is milking cows, and growing apples, Angora goats, potatoes and flowers, and this, that and the other thing, in one organization; we want definiteness, that concentration of forces that is in other lines of occupation in life. The more a man concentrates his efforts, the more he gets out of his business. The average

farmer doesn't know much of anything about potatoes. Look at Terry and other men who have become rich in just growing one particular crop. It is not necessary, either, that you grow one particular crop and nothing else. Other crops can be grown along with it well enough; it is advisable to have a rotation of crops. The man who studies definiteness,—definite lines,—is liable to get more out of life; get more money; larger profits; he is liable to be a bigger man; to be of more value in his community, in his commonwealth, in his nation. We are all living for some purpose and I wish to emphasize definiteness to every man on the farm. Here is where horticulture comes in and offers assistance.

There are few places where you have as good markets as right here in Vermont, likewise in New Hampshire, and in fact all through New England. The possibilities are great. This year I set out 10 acres of apples in Southern Michigan on my old homestead. Where do we sell apples? In England mostly; therefore, I shall have to ship them to Boston or Portland and meet sharp competition; you ship comparatively short distances. There is more money in raising fruits right here than in any other part of the country, on account of the markets.

When I was up in Maine at a convention of horticulturists, Mr. Libby of Newport gave his experiences along the line of definiteness. He said he was brought up on a farm and went into the lumber industry in the West. As his people grew old he came back to Maine to live and take care of them and started in agriculture on the homestead. Things had been going down on the farm while he had been away and he decided he would fix them up a little. His people told him that he couldn't afford to put on so much style; he said he made up his mind if he couldn't have a nice horse and buggy to ride in and a carpet on the parlor floor and an easy chair to sit in, he wasn't going to live on the farm. He began by raising strawberries,—no strawberries had ever been raised on the farm. As strawberries ripened about haying time, all the farmers laughed at him,—but his berry crop was ready money. He gradually went into the small fruits, and plums, apples, etc., until he has now one of the most prosperous farms and is one of the most prosperous men in that section. The people look up to him and respect his success in agriculture, and especially with those crops that come under the head of horticulture. I can give example after example along this line.

I was brought up on a farm and a certain time of the year we all got after the apple orchard. My father had never had the opportunity to attend an agricultural college, and not many farmers' institutes, but he endeavored to do the best he could

under the circumstances. We would all go down into the orchard with a cross-cut saw and axes and do the pruning, which consisted in cutting off big limbs and doing other harmful things. That represented the orchard pruning in our section. And then there was the man who did grafting,—the man who could put in a graft and make it live,—he was the biggest man in that section. The doctor and lawyer didn't begin with him.

We have plenty of natural fruit trees in New Hampshire today that are indefinite fruit bearers; they are worthless; they are a sort of blight upon our industry. You go over our farms, we have there trees of this sort that grow apples practically every year. You go out hunting, go through the woods and you come across one of these trees that is loaded with apples. You bite into the apples but you do not relish them because they are filled with railroad worms. Of what account are these apples, or the trees? They might make very good cider, and a good place to hunt partridges, but that is not apple growing. I believe it should be by law a misdemeanor to have such a tree on a farm. These old trees that have not been grafted over are the most worthless things on a farm.

I want to cite you a little experience with some boys I had at the college this year who came for a two years' course in agriculture, 22 boys from our best farm homes; they came with a purpose and signified it. I began to get acquainted with them by asking how many of them could harness up a horse,—all of the hands went up; then, how many could milk a cow,—and so on with a lot of questions,—and the boys commenced to think,—“I wish I was home.” I said to them: “Why, you know all about agriculture, or seem to, and why have you come here?” And they commenced to think they *did* know all about it. I then said, “Boys, I have some slips here, and I am going to put some questions on the board, and you may write the answers.” I put on the board such questions as this: “Apples. Name as many varieties as you can.” Also, “potatoes, cabbage, beets, etc.” “How many plants in a greenhouse can you name?” “How many shrubs?” “How many trees?” I gave them two and a half hours in which to write the answers, and said to them that it was not an examination and they were to feel free to write just what they knew; that I had been at farmers' institutes and I could not find many farmers that knew ten varieties of apples; that it was nothing to be ashamed of if they didn't know everything. The next day after I had looked at the papers, I said, “It seems, boys, that you have got to learn some of these things all over.” Some had not been able to name a variety of potatoes, let alone many other things, and knew nothing about the plants in a greenhouse. I told them that if at the end of a two years' course

they could not answer all those questions and more, that I should feel very sorry for them. I try to impress upon the students the matter of definiteness. Agriculture will teach us the things we ought to know if we are to be farmers. How much money can you make on hay; how many tons of hay to the acre can be raised? If a farmer cuts three tons he is doing well; if he has two tons left over after expense of harvesting is deducted, he has to get that to market; sometimes he is satisfied if he makes the two tons clear per acre, to net him \$15 a ton. If he has 20 tons of hay and he sells it for \$15 a ton, there is \$300. That is a possibility, if you are a \$300 man. If you are a \$1000 man, then you must do something else. How are you going to do it?

The matter of book keeping is an important one. The keeping of books gives a man an idea of what the possibilities are in his farming, and what he can really do with his different crops.

Apple growing is one of the finest industries, and can be made especially so with a little concentration and definiteness of purpose. A man who owns a farm cannot make a marked success of apple growing unless he knows something of horticulture. It is a step in advance from all-around agriculture, particularly if he is looking for that sort of thing.

Currant growing is also an industry in which there is a good profit, and I could give you several instances that have come under my personal observation, where with little capital to do with, but a good market, business has been developed in the growing of currants. Each of these cases has been successful because of concentration and definiteness of purpose.

The only trouble with horticulture is, it is too broad. We have the same trouble with horticulture as with agriculture. You ask what we teach in horticulture. Pomology, for one thing. About the orchard, apple, peach, trees, etc.; we go into their culture, which has been and is an industry in itself. Besides, small fruits,—raspberries and blackberries,—the red and black cap raspberries, the currant, gooseberries, strawberries, etc. I think there are 15 subjects and I have to hustle as fast and as hard as I can to just go over, so the men will know a little something about them, in pomology alone.

Then there is vegetable gardening; we give the men a course in that, and also a course in the greenhouse, and in laboratory work, too. We take the work among the plants, and have the student take cuttings and set them and mix the soil,—and at the end of the two years' course he should know something about their general culture.

I have hundreds of ideas I wish to bring out, but on account of limited time, it will be impossible to consider many of

them. Suppose we take up some of the subjects in which certain results have been accomplished: Currants—One man in whom I was interested, who had a small farm left him, and nothing to do with, and knowing little about horticulture, set out one acre of currant bushes, raised 6000 quarts of currants which sold for \$480 the fourth year. Strawberries—If there is a possibility of raising 7000 quarts to an acre we ought not to be satisfied with raising less than 2000 or 3000 quarts. Ten cents is not an unreasonable price to charge and if you raise 3500 quarts to the acre that will give you \$350.

I get only a small sum for running the practical horticultural work at our college. Our sales, however, have been pretty nearly \$3000 for the one department. We are putting a little commercial value into it.

Take early cabbage. We start them early in the spring in beds in the green house; put them into cold frames to harden off and set about 7200 on a single acre. These cabbages will vary in weight,—the Early Spring, one of the best varieties, will average something near 4 to 5½ pounds. We sold our entire crop at 3 cents a pound. This is so early a vegetable that we can clear the ground in time for another crop. We are rather far north, but some seasons we do very well with muskmelons. We can plant 1452 per acre (5 x 6 ft.) and the small Rocky Fords will average, under good culture, 10 fruit to the hill, which at 4 cents each gives us \$580.

Sweet corn, especially along the beaches where there are many clam bakes, is a profitable crop. We plant about 1620 hills to the acre; it doesn't require much attention, except good preparation of the ground, and at 8 cents a dozen will bring us \$129 per acre.

Then there is the growing of onions, and 600 bushels per acre is not an uncommon yield.

There is a man at Laconia, N. H., who raises lettuce, two crops in the summer, on the same land. His patches were 60 feet long and 6 feet wide. He sold the product at the rate of \$1850 an acre. That seems like a fairy tale, but his crop brought him only 2 cents a head and he sells it for the summer trade at Lake Winnepesaukee.

Then there is the plum tree. You know how many plums you can get off one tree,—the new Japanese kinds, for instance,—one and a half bushels is not a large crop; they will average higher than that; at \$1.50 a bushel they will bring \$382 an acre; and it doesn't cost much to spray and jar them. That is a part of the plum industry; if you don't know about the black knot and curculio and are not going to keep them off, then don't try to grow plums.

We have a man growing peaches in New Hampshire, and he has had four continuous crops; he sold 1100 baskets of peaches from 1½ acres and they netted him \$1 a basket. Then there are cherries; they are ordinarily hard to get in the markets in good condition and are usually from 10 to 14 cents a box,—the ordinary sour cherries. We have the Siberian varieties,—they are practically hardy and will grow well even in the north part of the state, and you will have no trouble in selling your crop. But if you don't know how to compete with the cherry slug, don't try to grow cherries.

The possibilities along these lines I have spoken of apply equally well to other crops. Definiteness of purpose is sure to result in benefiting agriculture. We attempt too many things. Choose one or a certain few crops and apply definiteness and concentration of purpose to them and you will succeed.

THE CULTURE OF OUTDOOR ROSES.

BY C. S. POMEROY.

Among the multitude of cultivated flowers now grown none is more beautiful or more loved by the florist or the amateur grower than the rose, and no garden, however rich and varied its assortment of shrubs and flowers, is complete without its rosary.

Like the majority of the flowers worth having, the rose, as a price for its beauty and splendor, demands care and attention. Left to itself many foes prey upon it, from the first opening leaf bud till the last withered petal, marring its beauty and impairing its vitality, but given this attention, what an ample return is offered.

In order that some terms which I shall employ may not be meaningless to the outsider, allow me to present a brief classification of the rose.

Three classes are formed. The first includes those varieties blooming but once during a season, consisting of the briars, most moss roses and such of the climbers as are hardy in New York State.

The second class is called the Hybrid Perpetual or Remontant, meaning to bloom again. These roses bloom intermittently at short periods during the summer and fall and are hardy in this climate.

The Monthly or Everblooming roses form the third class. These are indoor varieties with us, as they are too tender to thrive in our short summers and long cold winters. Under this group are included Noisettes, Teas, Bengals and Bourbons.

Hybrid Teas,—crosses with Hybrid Perpetuals—are stronger and hardier plants than the teas and with proper protection may be grown in our climate.

The essentials to successful rose growing are proper location and soil, quality of stock, pruning, cultivation, watering and watchfulness against the ravages of insects and diseases. All these contribute to the health and vigor of the plants, and the familiar observer can readily determine whether the proper treatment has been given.

A southwestern to southeastern exposure, warm and sunny and sheltered from the strong sweeping winds is the ideal place for the rose bed. The early morning sun is most beneficial to the plants, and it is claimed that they make more growth from sunrise to eight o'clock than during the rest of the day. Roses are very effective in the garden or as borders about lawns, either individually or in groups, but they should never be planted close to large deep rooted trees or in the shade of buildings or of other shrubs or bushes.

That any good corn land will grow the hardy roses is probably true providing other conditions are right, but the quality of the flowers will be just in proportion to the culture they receive. Roses are heavy feeders, and that means a good, rich, deep, loam, fairly well retentive of moisture. The red clay soils of New Jersey have been found to be admirably adapted to their growth. If the soil is shallow, sandy or gravelly or if it contains too much clay it is best to dig it out to a depth of eighteen inches and compost or fill in with a good loam soil. Good drainage is a necessity, as roses do not like wet feet, and will not thrive in a cool, damp place. Tardy starting in the spring may indicate ice-encased roots and poor drainage.

Having selected a site with the needed soil, it should be thoroughly worked over and softened. In setting the plants, spread out the roots and pack them with fine soil, then fill in and firm well. Maintain an earth mulch one or two inches deep, weeds or no weeds. This keeps the soil light, holds more moisture and aids the circulation of air and water in the soil.

Water should be given the plants at frequent intervals and in liberal amounts. Daily syringing of the foliage is an excellent practice, supplying needed moisture and aiding greatly in the fight against insects. Liquid manure is one of the best feeds for the plant, especially during the time the buds are forming. Care should be taken in its use, however, applying a weak solu-

tion at frequent intervals being much better than occasionally using a strong solution.

The vigorous growing sorts may be planted in beds four feet wide, making two rows with thirty inches between the rows. This allows the needed circulation of air, is not too shady and permits of picking the flowers easily. Hybrid Teas and other tender varieties may be planted in beds six feet wide, giving three rows two feet apart. This makes winter protection easy, by a frame filled in with leaves and covered with ordinary hotbed sash. In beds containing different varieties, the more vigorous ones should be set in the center and the smaller ones on the outside.

All roses taken from the open ground should be planted in the spring or fall; in this section better results probably being obtained by spring setting. Pot grown plants may be set at any time from April to October. If possible one or two year old plants should be used which have made an average growth of well ripened wood.

The rose is propagated by seeds, cuttings, grafting or budding, by layers and by division.

Seeds are used to obtain new varieties. Germination is usually rather slow, but the young seedlings make rapid growth and are generally fit for permanent planting when two years old.

Cuttings are a common means of propagation both out of doors and under glass. Ripened wood cuttings can be planted in spring and a good growth obtained by fall. Wood of the season's growth is gathered before severe frost, cut into six inch lengths and stored through the winter by burying in sand. When planted, one eye only should show above ground. This is the way recommended for nearly all the hardy varieties, though some root very slowly from cuttings or not at all.

Budding and grafting are old and well established methods of propagation. Budding should be done in July or August in the open air, on *Rosa Manetti*, *Rosa Multiflora* or any other good brier.

Grafting in the open air is not practiced to any great extent here though in the south it is employed to some extent with some hardy roses.

Layering is employed only when few plants are required as it is cumbersome and wasteful.

Division is an easy means of increasing many varieties which sucker. Plant them thickly in rich soil and after three or four years lift them and tear them apart and a large increase is obtained.

Plants propagated from cuttings or layers should be set, as nearly as possible, as they were in the nursery. Budded or

grafted plants should be placed with the bud or graft about two inches below the surface of the soil.

If very choice blossoms are desired remove all but the terminal bud on each shoot. This system, known as disbudding, is necessarily practiced by all commercial establishments in order to obtain the required length of stem. By leaving all the buds one may obtain a larger number of much smaller blooms and lengthen the duration of the flowering season somewhat.

Pruning is one of the most important features connected with rose culture and practical experience alone will enable one to determine just what to do in each individual case and just how to do it.

All plants coming from the open ground should be pruned before planting or just afterwards, as is done in transplanting trees. The yearly pruning may be done in early spring or late fall, the former being preferable, if done before the sap starts. A partial trimming back of the long branches is desirable in the fall to prevent their whipping about in strong winds. The chief objects of pruning are the formation of a symmetrical plant and the production of strong flower buds. In pruning for quality, as our foremost growers do, plants of delicate habit and tender growth are cut back severely, leaving only three or four eyes on a stalk. Vigorous growing varieties are left with six or eight eyes and the branches are thinned out. If they should be pruned as severely as the more delicate sorts, a great growth would result with but comparatively few flower buds.

Climbing varieties should be only sparingly cut back, it being sufficient to shorten in the too vigorous shoots and cut back the laterals to two eyes.

With many Remontants it is beneficial to prune slightly as soon as the first blossoming is past in order to aid in the formation of the later flower buds.

The method of pruning in general use is based on quantity rather than quality, and exhausts the plant by over cropping. Far better 15 or 20 first class blooms than 40 or 50 inferior ones. Close or severe pruning makes plants more resistant to insects or diseases by producing strong, vigorous wood even on very old plants, and they may be grown for many years, provided they are taken up and root-pruned once in 6 or 7 years.

For winter protection draw up the soil about 12 or 15 inches or better still, cover the bed with a mulch of straw and manure a foot deep. In this way the roots are perfectly protected and as much of the stalks as it is desirable to save. A bed of small varieties may be protected by a sectional frame as already mentioned.

Some bend the branches over, peg them down, and cover with earth and straw, others wrap them in manilla bags or a layer of rye straw. These methods are good, and may be desirable where close pruning is not practiced.

Protection should be provided early in November as it has a tendency to harden and ripen the wood before the severe cold weather sets in. Do not remove it too early in the spring. If a manure mulch has been used spade or rake in the fine material. Otherwise apply a little well rotted manure or some bone meal and mix it well with the soil.

As to varieties to be grown, so many are available and worthy of a place that I have experienced a good deal of trouble in selecting a few upon which I wish to speak.

Among the so-called wild roses and their hybrids are many sorts eminently worthy of a place in cultivation. They are perfectly hardy and adapted for all purposes. Their flowers are single except some of the hybrids but are very numerous and very beautiful.

The Russian type of *Rosa Rugosa* is one of the handsomest in cultivation. It forms an erect bush with fine glossy foliage, and flowers ten or more in a cluster. White and crimson forms are found and several semi-double hybrids.

Rosa Rubiginosa, the sweetbriar, is a very fragrant pink rose, cultivated especially for its foliage which is as sweet scented as most rose blooms.

Rosa Setigera, the climbing or prairie rose, is a native of North America with stem 15 or 20 feet long with single, deep rose flowers, changing to white in July. Baltimore Belle, a pale blush, and Queen of the Prairies, a rosy red, are the most valued double varieties of this wild rose.

Rosa Wichuriana, the trailing or Memorial Japanese rose, is beautiful in bloom and foliage and very valuable for its creeping and climbing qualities, as it can grow and thrive where others could not live. Yellow, pink, cream and white double blooming sorts are among its many hybrids. Dorothy Perkins, one of these hybrids, is a rose of splendid worth. It is a true Rambler, thoroughly hardy, bearing large clusters of beautiful double blooms of a shell pink shade.

Persian Yellow, an Austrian briar, is the finest of all hardy yellow ones. It has many small yellow flowers and its foliage is scented like the sweet briar.

Several climbing varieties of hardy roses have also been cultivated and are grown more and more every year.

The Crimson Rambler was probably the first successful variety of this class and is best known and most vigorous and hardy.

Helene was probably the first hybrid of the crimson introduced here and is especially valued as an almost thornless variety.

Philadelphia Rambler, a recent introduction, is in many respects an improvement over the Crimson. Its blooms are finely finished and double to the center, giving an effect of great depth and richness of color which continues without change through the life of the flower. It begins to bloom about ten days before the Crimson and is in perfection just as the latter favorite comes on, thus doubling the season for these showy roses.

The pink, white and yellow ramblers are also well worthy of consideration. One of the best varieties is the climbing Clothilde Soupert, a pure ivory white.

One of the most sensational new roses is Mme. Norbert Levavasseur or the Baby Rambler, the French rose that blooms every day. Only 20 inches high in its full vigor, abundantly supplied with finely polished dark green foliage forming a compact bush which becomes a mass of shining crimson. It is indeed a perpetual blooming dwarf Crimson Rambler and of the greatest use for every purpose to the florist and the amateur.

Among the Hybrid Perpetuals only a few of the many can be mentioned.

Alfred Colomb, a seedling of General Jacqueminot, carmine-crimson, large, full and fragrant, is one of the most useful of the class for general cultivation.

Baroness Rothschild, a light pink, is much valued for garden and exhibition purposes, but has no fragrance.

General Jacqueminot is one of the standard hardy varieties with large, brilliant crimson fragrant blooms.

Margaret Dickson is a white with a pale flesh center and large shell shaped petals and large dark green foliage.

Mrs. John Laing has large fine formed, soft pink blooms. It flowers continuously in the open ground and is one of the most valuable varieties for forcing.

Paul Neyron has very large, full, deep rose flowers produced very freely. It is one of the largest varieties and very desirable for the garden.

Ulrich Brunner is a cherry red, a highly valued seedling from Paul Neyron.

One of the most unique of the newer Hybrid Perpetuals is Soleil d'Or, the first of a new race. It forms a strong bush with foliage as fragrant as the sweet briar. Its flowers are sunset yellow or reddish gold and very fragrant. It is hardy everywhere and especially adapted for single setting.

Another fine new hardy rose comes from Germany. Fran Karl Druschki with fragrant double white flowers nearly as large

as American Beauties. It is probably the best hardy white Hybrid Perpetual.

Hybrid Teas may be called true perpetual roses. As yet only about fifteen varieties are hardy enough for our climate but they seem to be *the* future rose and may in a few years supercede the Hybrid Perpetuals.

La France is a silvery-rose color changing to pink. It is an invaluable sort, the sweetest of all roses and one of the most profuse bloomers.

Augustine Guinnoiseau, a white variety tinted with flesh color, is especially fine for forcing.

Captain Christy, Kaiserin Augusta Victoria, Caroline Test-out, Mme. Joseph Combet, Souvenir President Carnot, and Liberty are among the best of this class.

There are many parasitic diseases of the rose but only two are very troublesome in this section. The common mildew is the worst and a very rapid grower, causing the leaves to shrivel, blacken and fall. Its growth is caused or encouraged by draughts and sudden atmospheric changes, irregular or excessive watering or extremes of any sort. Dusting the bush with flowers of sulphur or spraying it with any standard fungicide will be sufficient to control its growth.

Black spot is a widespread fungus causing much loss among rose growers. Yellowish spots appear on the leaves gradually blacken and spread over the leaf and kill it, denuding a bush in a very short time. The leaves and ground around the bush should be well sprayed and all infested leaves gathered and burned. Hybrid Teas are especially subject to this disease.

The Rose Chaffer or Beetle is probably the worst insect pest in this section. They appear about the second week in June and live only thirty or forty days. They are not affected by solutions, dusting with Paris green or hellebore may check their work, spraying with water at 135° kills many, but hand picking is the only effective remedy, and a dish of kerosene is a good place to drop them.

The green fly or aphid is found on the end of shoots and buds. They increase rapidly and will suck the vitality from a plant in a short time. Tobacco in its various forms or kerosene emulsion will at all times keep them off the plants.

The presence of rose slugs is easily recognized by the skeletonized appearance of the leaves. Hellebore, whale oil soap or kerosene emulsion will destroy them.

Thrips are very small insects on the jump most of the time. Thorough syringing of the foliage is the best remedy against them. White hellebore or whale oil soap applied so as to reach the leaves from beneath will destroy them.

Red spiders are very troublesome in some seasons but will not attack plants sprinkled thoroughly every day. Hard syringing at mid-day or an application of whale oil soap to the under surfaces of the leaves will rid plants of these pests. Their presence is shown by the light color of the foliage and the great number of small pricks in the leaves.

In fighting all these pests it should be remembered that prevention is better than cure and that strong vigorous plants will aid a great deal in protecting themselves from the visits of such troubles and losses.

(Wednesday Evening)

APPOINTMENT OF COMMITTEES.

Committee on Resolutions—Kinney of South Hero, Hitchcock of Pittsford, Terrill of Morrisville.

Committee on Awards—Fruit—J. W. Clark, North Hadley, Mass. *Potatoes*—L. R. Jones and W. Stuart, Burlington.

PEAR CULTURE AND METHODS OF CONTROLLING PEAR BLIGHT.

BY A. M. VAUGHAN.

Pears should be planted in an orchard by themselves, i. e., they should not be planted with apples or other kinds of fruit as they require different treatment.

1. *Planting*—They can be planted closer than apples. A convenient distance is 15 x 20 feet. These can be thinned to 30 x 20 when time shall require. This will be all the thinning necessary as pears tend to reach up rather than laterally.

2. *Cultivation*—The requirements of cultivation are different. It is more important that pears be cultivated than apples and the time and frequency of cultivation is of more importance.

It will be noticed that pear trees commence growing earlier in spring than apple trees and also that they stop growing at least a month or six weeks earlier in the summer. Therefore, we should take advantage of this fact and commence cultivating

earlier in the spring and keep everlastingly at it and in this way we can get a satisfactory growth.

Do not try to make them grow later than they would if left alone normally. This is about July 1st. They will respond to later cultivation, but this late growth is undesirable as the wood does not have time enough to thoroughly ripen before cold weather. It is more apt to winter-kill and more susceptible to disease.

3. *Pruning*—The style or manner of pruning is not especially different from that practiced in apple culture. An open top is desirable because it gives a better chance to fight "pear blight." To obtain this form of top the central branch is pruned off entirely, and three or four of the best lateral branches left and these headed back to sixteen to eighteen inches. Each succeeding year's growth should be headed back to some definite length, say fourteen inches, and the top thinned out to suit the individual. This induces the main branches to grow thicker in proportion to their length than they otherwise would and enables them to bear up their load of fruit in later years, especially in varieties that tend to bear fruit on the end of branches.

It is best to keep all fruit spurs pruned off the main branches because the blossom is the starting point of pear blight and, should it enter at such a point, the whole branch must be sacrificed to stamp it out.

4. *Fruit*—The best fruit will be obtained by thinning so that no two touch each other. This will also do away with much trouble with codling moth as the shape of the pear gives a better lodging place for the eggs of the moth in a cluster of pears than in a cluster of apples.

5. *Diseases*—The same diseases and insects attack the pear as the apple and are treated in the same way. The most troublesome is pear blight (*Baccillus amylovorus*). It is the most destructive disease known to the pear industry and is most prevalent in the south and west, where in many instances it destroys whole orchards.

It is a bacterial disease that is spread mainly by bees and other insects during the blossoming season. It enters the blossom and spreads to the twig, branch and trunk. The affected parts dying as fast as the disease spreads. The leaves and bark immediately turn dark brown or almost black. The leaves do not fall off and this helps us to see it wherever it is present. Sometimes it attacks young tender twigs as well as blossoms. It lives over winter in the branches and in the spring the bark splits and a sticky exudation starts which attracts the bees.

The only known remedy is to cut it out and burn it. Care should be taken to cut several inches below any appearance of

the disease to be sure and get all that is affected. It is best also to disinfect the saw or knife after each cut. Then, if we do not always cut low enough, we avoid spreading it still more in the next cut.

Now it is easy to understand why an open top is desirable, for, if the tree was allowed to retain its leader and if blight should strike it, all above the point of attack would be lost. Whereas in the open top only one of the main branches is lost.

Fortunately pear blight is least destructive in New England and Northern New York, and strange to say this is the only section of the country where pears are not raised commercially to any extent. So it would seem that right here in Vermont is a golden opportunity for some young man who has a liking for this particular branch of fruit growing.

INCREASING THE FERTILITY OF THE SOIL.

T. B. TERRY OF OHIO.

What I shall say tonight about improving the soil for agricultural or farming purposes, will, of course, be applicable to all growers of fruit. You are all interested in having the soil rich and fertile. That is the foundation of successful agriculture all over this country. Perhaps you haven't noticed it so much as I have. For 23 years now I have traveled all over the country, from Georgia to Minnesota, from Maine to Delaware, and all over the West,—for 20 years I was not home a whole week throughout the winter. I never sought this work; it has always sought me, and I have noticed some things wherever I go. Where the land is rich and fertile, I find the farmers are prospering and not complaining, if they are any sort of business managers; but I can tell you of thousands and thousands of farmers who work just as hard, just as faithfully, and at the end of the year haven't a cent to show for it. What is the trouble? The lack of fertility in the land. They can't raise as large crops and can't make as much money. The last institute at which I spoke, over 1400 miles from here, I had precisely the same two subjects given me as I have here. They are all interested in the fertility of the land. My life experience has been right along this line, as many of you know.

Thirty-six years ago, my wife and I bought and moved on to a farm that had been run out by previous owners and renters,

until it would scarcely produce anything at all. You may ask why we bought it. I didn't know any better. I was born and brought up in a town; my father was a minister. I thought land was land, and didn't know any better, but I found out. The best crop of wheat it would raise per acre was 8 bushels. The first year we moved on the farm the mowing land averaged about a quarter of a ton of hay to the acre and half of that weeds. I planted an acre of potatoes. I got about 40 bushels of little ones and scabby ones and all sorts of shapes. I don't suppose I could have sold five bushels out of the 40. There are so many young men here I am going to tell you of my experience. We went in debt \$3700; hadn't any capital, except 9 cows, one horse, wagon and harness,—of course I had a wife and a baby or two in addition,—as poor as we could be. We went on there with the land so poor it wouldn't produce scarcely anything, and still within a dozen years we were cutting from 4 to 5 tons of clover hay per acre, two cuttings in a season, and 33 to 38 bushels of wheat; we were getting from 200 to 250 bushels of merchantable potatoes, just such potatoes as are on your exhibition shelves here. We do not have as good a climate as you have here, and those were not exceptional years, we would average those amounts. We did not bring any fertility on to that land; it was practically brought up out of itself by our methods. Certainly they are practical methods to work out like that. There were times at first when I was obliged to take my team and go into town, after we got 2 horses, and almost beg a job of hauling to get a little money to buy food with. We had no money to spend for anything at all. I remember a man once saying to me, "Terry, if you would buy a new hat, nobody would know you; your clothes wear like the children of Israel's." They had to. I had nothing to buy anything with. Gradually we built our land up. We made it fertile and then there was no trouble about our debts. The house we lived in for 14 years while we were building up the fertility of this land we sold for \$10 when we got through with it. The house we are living in now, built 23 years ago, with its contents, has cost us over \$8,000, and our little farm of 55 acres paid for it,—the farm that was supposed to be utterly worthless, and has given us all the improvements.

I may not impress this matter upon your minds in any better way than by giving you a few little incidents regarding the enriching of the soil.

If there is anything that I have to be thankful for, it is the fact that my father gave me a chance to obtain an education. I had been trained in college to study and think, not to work with my hands. When I got on this farm I could not help but think. I began to study over matters. We had a tenant on

the place one year after we bought it before we got moved on to it. I arranged with him to seed one lot down in the fall to timothy, five or six acres; he seeded only part of it, never had the time to finish it. When we moved on we wanted to finish the seeding in the spring. I said to a neighbor,—for I knew nothing about it, “What kind of seed shall I use?” He advised me to try clover. The farmers then thought timothy was cheaper and so they sowed it, but he thought it would do no good to seed to timothy so I bought some clover seed. It was a wet season; what little manure had been made and saved had been hauled on to it,—the rest of the farm didn’t have any,—being a wet season the clover did very well; of course it wasn’t anything like what grew later but there was a little second crop I could cut. When I was cutting it I noticed when I got on the clover half there was more hay at that end, and a little later when I was feeding the hay out to the cows in the barn,—the hay was put in, one load of clover and then a load of timothy, a layer of one, and another, I noticed when we changed from timothy to clover that the cows gave more milk,—that was a good while ago, remember,—there were no Experiment Stations then, but the fact was, that the cows increased their milk and the milk was our source of income. After a while I wanted to plow this hay field and put in corn,—half was timothy seeded and half clover seeded, you will remember. I hauled out what manure we had. I knew that spread it thin as I might there would be no more than half enough to go over the field, so I did what any other farmer would do under the same circumstances, I said to myself, that if I was going to have any good corn I would like to have it next the road where people would see it. It was a mere happen so,—I knew nothing about it,—but that simple thing put thousands of dollars into my pocket,—the timothy sod happened to be next the road. I began spreading the manure next the road and let it go as far as it would,—I hadn’t any money to hire any help. I paid \$1 for help the first year, and it was hard work to get the dollar to pay out, I can assure you. When I got it covered, it went about as far as the timothy sod went and the clover did not get any. Naturally, I thought, back over there there wouldn’t be any corn. This manure was rather poor quality, of course. The cows were poorly fed, as well as their owners, and we had no money to buy grain with only what was absolutely necessary. Such as it was this was the result,—to my surprise the corn was just about as good on the back half as on the front half where the manure was. Then I began to think; more hay to the acre by growing this clover; better hay,—the cows said so; increased fertility afterwards, I didn’t know how, but it was a fact.

Let me go back a little.

The first summer after we moved on to the farm there was very little I could do; there were acres there that scarcely had a green sprig on them. I happened to be going across the farm of my next neighbor one morning, and found him starting to do some plowing. He called me over and told me he had found it was too hard work for him and wanted to know if I wouldn't plow it and raise any crop I wanted to. I asked him what he would let me have the land for, and he said \$5 an acre. I thought it was pretty steep, but I was anxious to do something, so I agreed to it. I ploughed narrow furrows and a little deeper than it had been plowed before. After I was through plowing I took an old A spiked-tooth harrow and harrowed the ground over to break up the lumps; I also had a roller and I rolled it and broke the lumps somewhat more, then harrowed it up again and again rolled it and kept that up until I got it to looking pretty well on top, then I left it a while; I couldn't do any more it had got so solid. After a rain and the ground had got just dry enough I went over it again with a harrow with a plank across and I rode and tore the earth up three or four inches deep. The neighbors said: "Terry will do most anything if you will let him ride." I builded better than I knew. I had been brought up to do my work well, whatever I did, so I continued that work by spells in the neighborhood of two months until about the first week in June, when I sowed Hungarian grass seed. By that time I had the soil in as good condition as I could get it with the implements I had. The owner complained bitterly; he said I was ruining the ground, and that nothing would ever grow on it again, and that it would all blow away I had made it so fine. I wish you could have seen that crop. It stood about $4\frac{1}{2}$ or 5 feet high and as thick as it could grow. I remember that hay was scarce that year, and brought \$18 a ton. I thought I did pretty well. I figured I got about \$70 an acre from the land, and paid \$5. I didn't know how to farm, but I kept on thinking. The next year I had some ground ready to plow for corn; I wanted to put the same tillage on it and I began as early as I could. This land, remember, was not worth much of anything. I kept working it for two months. The neighbors planted their corn and it came up and was two or three inches high before I put my seed in; they said there was no use for me to plant so late, it wouldn't amount to anything, and would simply waste the land and my time. But I wanted to get the same results that I had with the Hungarian grass, and I didn't know how I was going to get them, but I was going to do the best I could. I got the results, too, a crop that was considered by everyone as wonderful. That was my first work in tillage.

Those two things came along together; this clover that brought me more hay per acre and better and increased fertility, and this tillage that had increased the fertility of the soil. I said to myself, isn't it possible in some way in working along this line to increase the fertility of this land, the whole farm, and make it productive, and then I didn't care how soon I left it.—I wasn't able to get away from it before I succeeded. So I began to change around gradually. We had nine cows. I sold eight of them so I could get money to experiment. It was dangerous, but I was bound to try it. We changed the land around and got our fields into shape so we would have three cultivated fields about equal, and there had to be some draining done. I laid every tile with my own hands; I had to work long days, and all day in the rain sometimes, when other farmers said it was too bad weather to work. Drains had to be put in; instead of spending money on clothes we bought tiles with it, and we also went in debt for them. Every bit of manure was saved, both liquid and solid, to be used as top dressing to make the clover grow. We used it as far as it would reach to help the clover start, also used straw for the same purpose; we grew clover, potatoes and wheat in regular rotation. The clover was good to get the fertility to grow the potatoes, and the tillage for the potatoes and to make the wheat grow, and so on. That was my idea, and I was bound to try it. I was getting \$1,000 a year at a desk in Hudson before I bought the farm; I wanted to become independent and get out of doors; I was offered \$1200 a year if I would return to my desk, I told my former employer I couldn't do it. I overheard two of my acquaintances in the city say of me, one day in passing my place,—and do you know sometimes a little thing will influence a man's whole life—one man said: "What is Terry doing out here? He can never succeed." The other answered, "I know he will succeed if he sticks to it." That determined me. I said I would not go back to the office, that I would succeed with my farm before I left it; I wasn't born on a farm, and didn't like farming, but it all seemed to be a series of happen-sos and I was bound to succeed and then go back to town if I wanted to.

In five or six years we began to be pretty well satisfied with this work, the growing of the clover regularly, plowing a little deeper every year and increasing the amount of tillage, and the results increased accordingly.

Briefly let me tell you how this clover growing and this tillage increased the fertility of the land.

By growing the clover as we did we were supplying the land with all the nitrogen it needed, and what is the use of buying nitrogen when you can get it for nothing?

Did you ever notice how the roots of the red clover grow? The big tap root grows down through the soil. There are about as many little roots in an acre of clover as there are in grass, but they are not in the same place; the big root extends down through the soil in the clover, and the little ones extend down from it,—maybe three, six or eight feet; your wheat and oats and timothy feed near the surface; the clover feeds deep; it cannot feed in the surface soil much. It takes a good deal of potash to grow clover. Where does clover get potash? Down deep where the potatoes and corn cannot feed. It is pumped up to the surface to make the crop; clover has the ability to thus pump it up. In a clay subsoil there is plenty of potash that is available. Your wheat and corn can't go down after it any more than they can get the nitrogen out of the air; so you see how wonderfully these crops help each other; drawing the nitrogen out of the air, and pumping the mineral matter up and bringing them together and making the soil rich to grow crops. There is fertility up above and fertility down below, and we are getting it right along. We made the land as rich as we needed it. There have been hundreds of men from all over the Union during the last twenty-five years come to our farm to see these things. Pretty soon after we began to raise these crops, along in 1881-2-3-4, there were many. One day we had forty men come to our farm, so great was the excitement. They could hardly believe their own eyes. Among others, Professor Roberts of Cornell came and it made me glad when I saw him for I knew some of the things he had said about the farming we were doing, ruining the soil and all that. He wouldn't say much, but he went around and looked at everything. I showed him the second crop of clover above our knees as we walked through it; I then showed him some land we had not touched. He asked a few questions and went back home. I imagine he said something like this: "Terry has been carrying on something we don't understand; and there is something in the idea after all." He commenced that experiment in tillage at Ithaca, and has practically revolutionized tillage in New York. Professor Roberts took samples of soil from all over the state from average farms, and this is what an analysis showed:

4500 pounds Nitrogen.

6300 pounds Phosphoric acid.

24,000 pounds Potash.

Well now, with all this fertility in the soil, what are we buying fertilizers for?

I went to the first institute in Wisconsin they ever held there. I was telling them what I believed to be true about the clover business. I sat down beside Professor Henry—he and Professor

Roberts were the first authorities in the country on such subjects—and I was young then—I said to him, "Tell me what you think of what I have said to-night." He replied, "I believe, as a farmer, you are right, but as a scientific man I dare not say so in public."

These things have all proven out beyond question, but not until we have proved them by our own work, and there are hundreds and thousands of farmers all over this land that I could take you to who have worked out these methods, some of them even better than I have done. You can't do it all in one year, or five; it is a plan and a system which you must commence and stick to, and each year you will notice the increase. You must not sell off your products, you must save all the manure; drain land that needs it; follow out the plan of growing clover once in about four years; then follow out the line of tillage I have told you of and there is no trouble at all in eight or ten years of doubling the fertility of any land that was originally good.

Of course there are many things that have helped us that I haven't the time to speak of in connection with this subject. I have simply brought out the two greatest things to my mind—the clover growing and the tillage. We save every particle of manure, too. With the knowledge I have now, I could take land such as we bought and in six years bring it up to the state of cultivation it did reach in twelve. I say these things because I want you to know there can be no question about it.

Our State Board of Agriculture, after examining into the matter, gave us the first prize of \$50 for the best and most perfectly managed little farm in Ohio,—and only thirteen years from the time we started on land that was almost worthless. Do you wonder then that I am willing to leave my home where we have everything the heart can wish for, and go around and tell others how to do just the same things? I like to talk to the young men; I would go almost anywhere to talk to a few hundred young men about it. There is no other more honorable, legitimate, healthful employment than advanced agriculture; no work in which there is the same amount of money received from the investment. You can't put \$5000 into any other business and receive the same profits as you can in agriculture, if you work along the lines I have told you, whether gardening, raising fruit, or otherwise. There is more money in a small way in raising fruits and vegetables of fine quality than there is in farming; we made our money largely on potatoes.

I hope what I have said to-night will determine you to start out along these lines and determine to carry them out until you increase the fertility of your land, no matter what line you may be following, so that it will produce larger and larger crops and you will be able to make more and more money.

PRACTICAL PLANT BREEDING.

BY PROF. F. W. RANE.

The subject we have heard discussed to-night, I am sure, has been very impressive to all of us. As I was listening to Mr. Terry I went back to the time when I was a student in college. He was at that time at the height of his potato industry; he was engaged by the Ohio State University to give three lectures on potato growing. A few weeks ago at a meeting in New Hampshire we had such men as Mr. Agee of Ohio and Professor Rice of Cornell University, and for some reason or other I was on the program to follow them. After listening to them I wondered what there was left for me to say. Mr. Agee had the same subject as Mr. Terry here to-day,—that of soil fertility. He handled the subject along the same lines as we have heard here, only under different conditions. After listening to these men a man can see what definiteness of purpose means; what he can do along certain definite lines, and there are so many opportunities open for us if we go for them in the right manner, *with* definiteness of purpose. The question is of meeting conditions. Undoubtedly Mr. Terry worked under different conditions than we may have here or in some other sections; nevertheless, the same general conditions exist and we are to and can solve the problems just where we are placed. We have remarkable markets and a great deal of produce comes from elsewhere.

After leaving the high school I took up bookkeeping. I made up my mind shortly that being housed up was too rigid for me; that I was not built on that scale; I had rather get out in the open life instead of staying indoors. I went to college and chose the agricultural course. We need strong men in agriculture. The thing that New England needs,—what Vermont needs, is strong men in the various counties and communities; men who know their business along breeding lines and who know how to handle it. Every man who goes out from our agricultural colleges into the different communities will be of as much value to the people as the preacher; he stands for the uplifting, the salvation of the people; he is valuable. Do you suppose the men who are living alongside Terry are living in the same old ruts as before they knew him? The results are, that we have

more good agriculturists in such sections, and they are of great benefit to the country at large.

There are men about Boston who have studied agriculture and horticulture and within from three to six years are getting salaries from \$5000 to \$10,000 a year. What is greenhouse work? Is it anything but concentrated agriculture?

In regard to growing of crops. Put a young man in the greenhouse; he knows his plants are going to grow for he has the proper soil, soil with life in it. Why is it that people send their plants to a greenhouse to be potted and repotted? Because they know the men at the greenhouse understand what to give the plants to make growth. That is why the farms will grow and produce great crops, because the men learn how to make the soil productive at school. Take a man that is successful in a greenhouse and you will have a successful farmer. Why? Because he knows how to concentrate his efforts.

In regard to the practical breeding of plants. The question of soils is a big one, and we must study it. It takes a man a year or two to become familiar with soils, and to know why one soil is different from another, and why one field is so different from another field.

After we have studied the soil and know soil fertility another thing that comes in very directly is practical plant breeding. Until within a few years we have known comparatively little about plant breeding. We have known about the breeding of live stock and we pay a good deal of attention to the breeding and improving of live stock; going abroad and paying large sums of money for certain breeding animals for the purpose of building up the stock. We can build up and improve our plants and shrubs as much, I am sure, but we have got to know how to do it. People don't know plants; you go through a greenhouse, which is a concentrated form of agriculture; you pass through it, and glance at it, and you make up your mind at once whether the man in charge knows his business or not. If the plants are covered with some disease, or the temperature is too high or too low, it will show in the plants. They say that in the florist business about 94% make a success of it. Some men try to grow plants that need a good deal, and plants that need little, moisture in the same room. What are the results? The greenhouse worker has his farm under glass the same as the farmer has his farm out of doors.

I have looked up a few subjects that we have been studying in recent years one, the improvement of the squash. I have sent all over the country where I could get new varieties and endeavored to grow them. I wanted to find out how the squash originated. The best I can find out about the various varieties

is that they have come up of themselves,—merely happenings. The breeding of other plants have come about in much the same way. When my grandfather would come home from New York State, when on a visit, he would be loaded down with seeds that had been given him, they being a better strain than he had, or something new. We depend too much upon seedsmen for seeds. You go into Boston to buy grass seed and ask them the price. You will find two prices. You have to pay a little more for the best clean seed. They will tell you they keep the best in stock and sell the cheaper grade to the sub-dealers in the small places, for they won't pay the price for the best seed. If you buy and pay the price for the best seed the chances are that you get good clear stock that will give you good results.

How is it with other plants, along the same line,—the muskmelon, for instance? I was particularly interested in the growing of this crop because I was growing melons before coming to New Hampshire. You will find no difficulty in getting men to give you their experiences in raising them, and seedsmen will give you seeds marked "extra"; more often they are very *ordinary*. It is a part of the question of breeding, to be able to know the breeds, and whether you have true types. I can remember when I was a youngster in southern Michigan how plant breeding was treated. When my father got ready to seed down, grow wheat, or plant corn, if he didn't have corn that produced a fair yield, he went to some other farmer whom he knew was a good farmer, and obtained seed from him and planted it with all the assurance that it would yield big because it came from a good man. You may procure seeds from various sources and at all prices but if the life is out of the seed you won't have good results.

I believe the question of plant breeding in horticulture and horticultural work in particular, can be held up to the standard, provided the man interested knows good plants when he sees them; knows the source of good live seeds, and knows how to handle them. That is why I believe in concentration of efforts. If he spreads his efforts over a great many crops he won't get the results he will get if he would concentrate them. You must know the individuality of a plant to do your best with it. If a man is going to grow geraniums or roses he is bound to acquire all the knowledge possible in regard to their growth, if he is to succeed. I know a man getting \$4000 a year as foreman of a greenhouse, for raising roses. He doesn't pretend to know all about roses, but he can grow them. He is making a success of them; he sells roses for \$20 a dozen; that is concentrated effort.

The same is true of the orchard. It is possible to get annual bearers; you must learn to know the trees,—the different kinds.

There is as much difference in apple trees as in the different kinds of cows in a barn. You will find our successful nurserymen are paying more attention to taking scions or buds from trees that produce good fruit and are prolific than heretofore. It isn't so much the number of barrels of apples a tree produces one year and then not any for a number of years, as the fact that a tree will yield apples of a fine quality and yield them every year. This point, if followed out, will make a successful apple grower.

The same is true in the growing of peaches and plums.

In all of these matters, much depends upon the individual himself. If a boy comes to college and goes to sleep and has no backbone to be something, you can't do anything with him. There are great possibilities for the young man if he will but make himself alive to his opportunities and grasp them, and nowhere will he find such splendid opportunities as along agricultural and horticultural lines.

PRESIDENT'S ADDRESS.

During the past few years much has been said in the press of our state about a new Vermont. The forecast of the future has been filled with promise and with hope for better things. We all desire to see the vision a reality, but we must not forget that its realization can be possible only through the persistent effort of those who have in their keeping the industries of the state. If Vermont is to grow there must be a growth in her agriculture, her manufacture and her commerce. Perhaps, then, it is fitting to consider to-day the part we may play as horticulturists in the making of a New Vermont.

It has always been the pride of Vermont that her finest product was her men and women. It has been her misfortune that she has been unable to keep them. Boys from Vermont farms have gone away—many of them to take part in the development of the new states of the West, many to enter into the business and professional life of cities. In consequence Vermont's agriculture has suffered.

Why have they gone? I believe a cause has been the trend of education. From the district school through the preparatory school and on through college the education has all been cityward. The child in the country school with a wealth of material at hand in field and forest and sky for the training of the mind and of the senses has had to turn from these to the printed

pages of a book. The old district school houses with windows put almost ceiling high, in order that the child might not have his attention drawn from his studies, testify to the old ideal in education. That charm of country life which comes from a knowledge of and a cooperation with the processes of nature has been lost and agriculture has paid dearly for it. I believe that this society should take part in that movement now on foot to introduce elementary science into the courses of our rural schools.

I believe another and, perhaps, the greatest cause why young men have left Vermont farms has been the prevailing discontent among those engaged in agricultural pursuits. Votaries of medicine, the ministry, and the law have believed in their work, and the world has been ready to agree with them. The farmer has been inclined to put a small estimate upon his and the world has not thought more of it than he has himself. In his famous address upon "The American Scholar," Emerson said, "Young men of the fairest promise, who begin life upon our shores, inflated by the mountain winds, shined upon by all the stars of God, find the earth below not in unison with these, but are hindered from action by the disgust which the principles on which business is managed inspire, and turn drudges, or die of disgust, some of them suicides. What is the remedy? They did not see, and thousands of young men as hopeful now crowding to the barriers for the career do not yet see, that if a single man plant himself indomitably upon his instincts, and there abide, the huge world will come around to him." It is time for the horticulturists to stand upon their instincts—upon their belief in their work and to bring the world around to their point of view. Then can we save to our state the young men and women who are alert for opportunities to make the most of their lives. How can it be done? First by the culture within ourselves of a more liberal and progressive spirit.

In the past fifty years the whole aspect of agriculture has changed. Leeuwenhoek, a Dutch microscopist, discovered bacteria in 1695, but only within the past fifty years have they been regarded as more than a cause of speculation for the curious. Within that time our scientists have shown their agency in the diseases of plants and animals and their importance in all processes of agriculture. Today the world is hoping that the problem of its supply of nitrogen may be solved in the cooperative efforts of clover, alfalfa, and other legumes and bacteria. Other fungi have been investigated and means devised to combat those that are injurious and assist the growth of those that are beneficial. Plant physiologists, chemists, physicists have all brought to bear upon the problems of agriculture the best knowl-

edge of the time, and the results of their investigations are the property of him who will read them. As our early pioneers pushed ahead into new lands to subjugate them and turn them to good account, so have the pioneers of science pushed ahead into unknown and unseen worlds and found for us the laws in accordance with which not only our plants and animals but ourselves must live. It was a son of Vermont, Justin Morrill, to whom a memorial will soon be erected on yonder campus, who, by the founding of the agricultural colleges and experiment stations, made this great work possible. Then as sons of Vermont we should be the first to receive this new truth and show what can be accomplished by its application. The great need of our agriculture is men to apply the truth we have with some of that enthusiasm and faith which has been so characteristic of the other professions. This society is a good place for it to start. Once started the spirit will be contagious and I believe the results will be amazing.

Again, we may attract attention to horticulture by advertising its opportunities. What are they? Surely not those of the New York Life, the Equitable or the Mutual. You can't systematically steal from nature without having your salary immediately cut down. But there are opportunities to make honest work count. Opportunity in business consists simply in giving the world what it wants. Its wants are increasing every year. It wants more packages of perfect apples, more baskets of perfect strawberries, more clusters of roses. The man who anticipates these wants and makes ready to supply them makes his own opportunities. Our soil, our climate, our location—all ideal, are waiting for the touch of man. If you wish examples of rewards of success take Kinney of Grand Isle or Hemenway of Addison. Patient, careful, thoughtful work has brought its reward and will in every case.

Most of us were brought up to hold the people of Japan in slight regard. But all the time there were unseen forces at work the results of which have astonished the world. Japanese youth were sent to other countries to be educated and they were encouraged to go home and put in practice the best which they had learned. That broad, open minded spirit made Japan a world power. That same spirit infused into our youth would make a *New Vermont*. Let us as members of this society do all we can to encourage and foster it.

COLD STORAGE AND MARKETING OF FRUITS.

BY JOHN W. CLARK, NORTH HADLEY, MASS.

The use of specially constructed houses in which the temperature can be controlled by artificial means for the preservation of farm products dates back scarcely a score of years. Yet so rapid has been its adoption that now there is scarcely a city of any considerable size but has its cold storage plant.

As most of these cold storage plants are too complicated and costly for the use of the majority of fruit growers I will not take time to go into the details of their construction and management but confine myself to the style of house within the reach of those who make apple growing one of the principal branches of their farming operations.

A house for storing fruit should be so constructed that the variations of the outside temperature does not materially affect the inside of the house. To accomplish this the walls should contain closed or dead air spaces sufficient in number to overcome the extremes of temperature to which it is to be exposed.

The house which I have was built in 1898. It is 32 x 42 ft. with 7 ft. posts and 2 x 4 inch studding between. The outside of the building is covered with novelty siding. Building paper is put between the studding and then it is boarded with matched pine which is in turn papered and 2 x 4 inch studding put up and boarded. The four inch space made by this boarding is filled with charcoal dust and the boarding covered with paper, after which another dead air space is constructed. This makes a wall about 16 inches thick with three four-inch air spaces, the middle one of which is filled with charcoal dust.

The foundation of the house is of stone with six courses of brick for underpinning. Under the roof, above the main part of the building is an ice chamber 6 x 9 feet running the whole length of the house. The floor of the ice chamber is covered with galvanized iron and inclined one inch to carry the water from the melting ice into a gutter from which it is carried by waste pipes into a tile drain in the ground. Extending the whole length of the ice chamber on each side is an open space fifteen inches wide connecting the ice chamber with the storage room below for the circulation of air between the two. In each end of the ice chamber are double doors for putting in ice which is stored in an icehouse near the rear end of the main building.

Icing—The ice is drawn up to the ice chamber by a horse and pulleys. About two hundred twenty-inch cakes are used in

filling the ice chamber, which must be filled three or four times to carry apples through the season.

In the main building at each end are double doors, between these are sliding doors with iron rods three inches apart. The sliding doors are closed when the other doors are opened to lower the inside temperature on frosty nights.

The floor of the house is of brick with the exception of a concrete driveway nine feet wide and a walk four feet wide to the work room, 22 x 14 feet, which is connected with the storage room by double doors.

When ice alone is used to cool the house the temperature will not be reduced much below 42° F. If it is important that a lower temperature be had before frosty nights occur the ice should be crushed fine and mixed with salt. Salt has a great affinity for water and coming in contact with the ice extracts the water from it very rapidly and by changing it from a solid to a liquid produces intense cold. The changing of ice from a solid at 32° to a liquid at 33° F. has one hundred and forty-two times as much refrigerating effect as the same weight of water has when raised one degree in temperature.

The best temperature for keeping apples is 32° F. and the less it varies from this the better will be the results.

When a house is cooled with ice in direct contact with the atmosphere of the storage room, the moisture contained in the atmosphere will increase rapidly as the temperature of the ice chamber and storage room become the same and it will be advisable to open the house and air it when the outside temperature is near that of the storage room. Care should be taken not to open the house when the outside temperature is warmer than that inside, for when a warm atmosphere comes in contact with a cold surface its moisture is condensed and deposited on that surface. Moisture is not as objectionable in a house designed for apples alone as it would be if other farm products were to be stored, for apples need sufficient moisture in the atmosphere to keep the fruit from shrivelling.

If a dry atmosphere is required the house should be cooled by pipes with brine circulating through them and not by ice in direct contact with the atmosphere of the storage room.

Cold storage does not add anything to the appearance or quality of the fruit. An apple, if properly ripened, never looks any better than when it is first picked from the tree. Cold storage simply retards the ripening of the fruit and checks the rapid spread of whatever disease it may be affected with. Neither decay or spread of disease will be entirely checked unless the fruit is frozen, but will go on more slowly as the temperature approaches the freezing point. One cannot put poor and imper-

fect fruit in storage and take out good. For best results, apples, as a rule, should not be picked before they are fairly well colored. The Baldwin for example if poorly colored is more liable to scald than when well colored. Different varieties of apples vary in their ability to withstand scald while in storage. An apple should not be left on the tree until it is overripe before being picked or its life will be short even in cold storage.

Apples that are to be stored should not be put in heaps on the ground or kept in a warm place for any considerable length of time before being stored for they ripen much faster after being picked than when hanging on the tree. An apple that begins to ripen before it is placed in cold storage will continue to ripen after it is stored, but much slower. While an apple that is picked at the proper time and placed at once in cold storage will keep almost indefinitely.

The advantage of a cold storage house to the orchardist may be summed up as follows:

The time required to gather his crop can be shortened as all of the help can be kept picking the fruit instead of a part sorting and barreling as one is obliged to do if the fruit is to be shipped.

The cheaper grades of fruit such as the dropped fruit can be kept until the glut caused by this class of fruit is past when better prices can be realized.

The work of sorting and barreling the fruit can be done later in the season when help is more plentiful than at picking time.

The grower has a longer time in which to market his fruit and a chance to take advantage of any rise in prices.

The loss from decay and shrinkage of the fruit while in storage is reduced to a minimum.

Marketing Fruit—Closely connected with the storing of fruit is its marketing, and from the discussion that has been going on in our agricultural and horticultural papers the barrel and box question has been made one of the most prominent. The grower of apples has been advised in the majority of cases to pack and market his fruit in boxes, but he is told that only the best fruit should be shipped in boxes.

The prices obtained for boxed fruit from the Pacific slope and for choice selected fruit packed in boxes by eastern growers are given as the ruling price paid for boxed apples, and the reader gets the impression that to the box and not to the superior quality of the fruit is to be given the credit for the extra price received.

The apple trade of New England today calls for barrels and not boxes. The retail dealers of our cities obtain their sup-

plies of the receivers of jobbers in from one to five barrel lots. They prefer the barrel and as a rule reject the box. The empty barrel has a market value while the box is unsalable.

The use of the box and the barrel as a package in which to ship apples to market belongs to two distinct classes of apple growers. For the specialist who spares neither labor or expense that he may produce the best fruit possible, and who puts it on the market in a neat and attractive package, the box may in time prove the most profitable and satisfactory package. For the average grower of apples in New England however, the barrel will continue to be the package for some time to come.

The greater part of our New England apple orchards are in sod which if the soil is rich enough to grow grass that will pay the cost of cutting is taken off as hay and carried to the barn. The orchard is seldom fertilized, plowed or pruned, and never sprayed. As a result of this management a large part of the fruit produced is of inferior quality; not over one-fourth or one-sixth of it can be classed as strictly No. 1. If this small quantity of good fruit is taken and boxed that which is left will present a very poor appearance and go on the market as second grade at a low price and the price received for the whole crop will be less than if all of it had been barreled.

The scarcity and high price of barrels has had much to do with bringing the box to the front as a package in which to market apples, in hopes of reducing the cost.

The cost of packing a given quantity of apples in boxes is equal to if not greater than when packed in barrels and requires greater skill in packing.

Growers must not be misled into believing that the package sells the fruit, although it may help. The price received will depend on the quality of the fruit and the smaller the package the better the fruit must be. Medium or second quality fruit shows its defects more distinctly as the size of the package is reduced.

To educate the majority of our apple growers so they will grow choice fruit and pack it properly is to me a very unpromising task for the reason that apples are a side issue in their farming operations and considered the least profitable. The trees to them, add no value to the land, and in many cases the farms would sell for more money if every apple tree was removed.

If the fruit grown and packed by the average grower is to be placed in the hands of the retailer in a smaller and lighter package than the barrel, that package in my opinion will be supplied by the retailer who fills them from the barrel and then places them on his stand in a way to attract customers. A much lighter package can be used in this way than when the fruit is

packed by the grower, for if shipped the package must be strong enough to keep the contents from being bruised in transportation.

If a smaller package than the barrel is to be used for shipping fruit the box will be the package but its size cannot be less than one-half barrel or one bushel, without becoming impracticable for even the specialist. That the box will be used more each year I firmly believe and in time it may take the place of the barrel with our best orchardists. Today the barrel is the standard package and a demand for boxed fruit will have to be created by the superior quality of its contents rather than the style of package used.

Questions:

Mr. Tracy: Is there any advantage in putting in the 4-inch studding?

A. 2 x 4 studding is the ordinary building size.

Wouldn't it be all right to have it turned?

A. It would not make quite as stiff a wall.

Would it not be stiff enough and give you a little more room?

A. You simply want a good air space that will prevent the cold getting into your house.

Mr. Hitchcock: If a good quality of paper is used is it necessary to use matched boarding?

A. I should use it; it don't cost much more and you will get a tighter house.

Member: Do you say one inch is as good as four inches?

A. I should judge it would be, perhaps; it is the space that prevents the cold getting back into the house.

Mr. Vaughan: Wouldn't the moisture from the melting of the ice keep the air moist even with a concrete floor?

A. There would be very little moisture. The moisture as it works in one way and another would be more than from the melting ice.

Mr. Kinney: Will it injure the apples any to have moisture on them?

A. No, sir.

What is the harm of opening the house on a warm day?

A. There is no need of it; you want to keep the temperature at 32°, and not vary it; the variation of temperature will hasten the ripening and they will not keep as long.

Regarding box and barrel packing of apples.

The cost of the boxing is more than barreling. The cost of putting the apples in the box is more than placing them in barrels, because your apples have to be sized to place them in boxes; it requires more skill to pack a box than a barrel and costs more money. I have never had any call for boxes. If I used them I should put something on the top and bottom of the boxes to protect the fruit. As you reduce the size of package you necessarily have to increase the quality of your fruit.

Member: Does it pay to wrap apples in tissue paper?

A. I don't think it would pay. The middle partition in a box is a great help; without it the box is not stiff enough to hold the apples from bruising. But if you want to pack your apples in fine shape, pack them in layers, and between each layer place a cushion; in that way apples will ship without having a single one bruised; it is the extra work that gives you the extra money. The above applies to boxes. When I barrel my apples, I put one layer stems down then the rest are put in without facing; some double face, put two layers. I don't. Have a plank floor on which to rest the barrel; when the barrel is full I use a false head and put it on the top of the barrel; perhaps the apples stand an inch above the chime, by chucking you will get them to settle. In that way you can press them without bruising, and they are in a good deal more solidly than if you put the pressure on all at once,—I mean by using the false head.

A bushel box will, in my opinion, be supplied by the retailer, if he wishes to supply the trade with smaller packages; he can give to the customer a much lighter package than the grower can, because the grower cannot put his apples in a much smaller package than a bushel box, and that box must be heavy enough to stand shipping.

Mr. Vaughan: You have spoken of placing your No. 1 apples in the city for storage. How much does it cost you?

A. At Springfield, 40 cents a season; in Boston for small lots, 60 to 65 cents.

That is more than it would cost you to store at your own plant?

A. Oh, yes,—but in the spring when I want my apples on the market on short notice the roads are in bad condition and it is quite impossible to get them to shipping points. Then too in the city the temperature is kept exact. In my house I can keep it, after freezing nights come, so it don't vary more than 2 or 3° all winter and that is about as close as they keep it.

“THE IMPORTANCE OF WISE SELECTION OF THE
VARIETIES OF VEGETABLE SEED BEST SUITED
TO THE NEEDS OF THE PLANTER.”

W. W. TRACY, WASHINGTON, D. C.

(I am very glad to have the opportunity of speaking to you, and there is no state in the Union that is dearer to me than Vermont. I didn't have the honor of being born here, but my parents were and my early boyhood days were spent here in Vermont,—so for that reason I am glad to speak to you. When I was a boy in college they used to say that “Tracy was all right, but he talked so much with his mouth that he didn't say anything.” Now, I have got something I want to say to you, and so that my mouth won't run away with me I have written down some of the things I want to say, but I assure you the thoughts come from my heart as much as if they were spontaneous.)

In considering the selection of varieties of vegetables for special locations and uses, it is important that we first come to a clear understanding of what we mean by variety. In the case of plants propagated by division, whenever one finds an origination or mutation, whether it comes from a bud or a seed, which he thinks is of such distinctive merit that he propagates it by budding, cutting or other forms of division and designates it by a name, all of these plants so propagated constitute a variety. When any plant belongs to a variety or not is not determined by its character but by its origin for although the plants of the same origin must be of practically the same character all the plants of practically the same character may not be of the same origin. I think our courts have decided that in the case of plants propagated by division, though a plant can not be distinguished from those of any certain variety, it can not be said to be of that variety unless it traces its origin to the original single mutation. A grape which can not be distinguished in any way from a Concord can not properly be called a Concord grape unless it was produced by a vine which was propagated from the original Concord vine and is in reality, indeed, a part of it. In the case of plants propagated by seed, variety means something quite different. Here whenever anyone secures a lot of seed, all of which he is reasonably sure will produce plants of a certain definite and named type, these seed are said to be of that named variety, but in just so far as they fail to produce plants of the type and character of that sort they and the plants so produced

are not of the variety. Here the question of whether any plant is of a variety or not is determined by its character and not as with plants propagated by division, by its origin. Of two peas from the same pod one may produce a plant exactly like the one that produced it and a fine representative of the variety, while the other may produce a very different plant which can not be considered as of the variety at all. In the absence of any positive knowledge as to what the two seeds would produce and *assuming* that they would both develop into plants like the one that produced them the two seeds may be said to be of the same variety, but the plants raised from them can not be said to be of the same variety. Varieties with seeds as with fruit come into existence because some one under a certain set of conditions has found that plants of that type are more satisfactory for certain uses than those of any variety with which he is acquainted. The qualities which make it desirable for this set of conditions and for this use may be, indeed generally are, the very ones which make it unfit for other conditions and uses: (Illustrated in a comparison of the qualities of the Davis Wax and Yosemite Wax beans and also in the difference of the types of the Refugee Wax bean as sold by different seedsmen.) To ask a seedsman to tell what is the best variety of bean or tomato without information as to the conditions under which it is to be grown or use to be made of the product is as unreasonable as to ask the druggist what is the best medicine without any information as to who is to take it and what it is to be taken for.

Now the character of the plant which any given seed will produce, its adaptation for any particular condition or use, is determined by the balanced sum of the tendencies and characteristics it received in different degrees from each of its ancestors back for an indefinite number of generations. Sometimes the mother plant is the dominant influence, again the mother may have scarcely any controlling influence, while that of the great-grandmother or some other ancestor still further back may be the dominant one, so that we can only be sure as to the character of the plant any individual seed will produce in proportion as we know the exact characteristics of all its ancestors and that they were identical. The importance then in the production of seed which can be relied upon to produce plants of a certain variety of a rigid adherence in breeding to plants of an exact type, is evident. It is equally evident that there can be no rigid adherence to type unless that type be clearly defined. Have varietal types of our garden vegetables been so defined or adhered to by seed growers, or so defined and described that planters can easily learn the exact characteristics of the plants any seed of any variety will produce? We have an abundance

of seedsmen's catalogues, many of them beautiful in design and execution, but do they give us much real information as to the character of the different varieties offered? Are not these descriptions of sorts rather a glittering string of superlative adjectives designed to induce the reader to buy the seed rather than a statement of the exact qualities of the varieties offered? Different seedsmen sometimes describe and furnish the same type under different names and again they furnish different types under the same name, the accompanying description not being definite enough to reveal the difference. Now I do not wish to be understood as branding seedsmen as dishonest or deceitful. I think they are quite as honest and reliable as the other class of tradesmen but they are not in business from any altruistic motives, but to make money and their catalogues are prepared and distributed for the purpose of *selling seed*; and although a half truth—a silence, may be more misleading than actual false statement, in common business ethics, they are not regarded as so dishonorable. In the case of the Davis Wax beans referred to, it is amusing to one who knows the sort, to see how eloquent the various catalogues are as to its acknowledged good qualities and how silent as to its defects. Again there is often a great difference in the cost to the seedsmen of the seed of the same relative purity and quality but of different varieties and the ordinary purchaser is rarely willing to pay this difference, and seedsmen can not be blamed for pushing in their catalogues the sale of the sorts which yield them the greatest profit even if it is not the sort best adapted to the planters' needs. During the thirty years I have been in the seed business I have known at least 25 varieties to be dropped from the lists by seedsmen and so out of cultivation, which were admittedly superior for some purposes to the sorts retained but they were dropped simply because it was found to be so costly to produce seed of these sorts that there was no profit in handling them.

Let us look at conditions actually existing in regard to one of our most popular vegetables, the tomato. Bulletin No. 21, Bureau of Plant Industry, lists 321 named varieties of tomatoes offered by American seedsmen in 1902. Of a list of 35 varieties tested in 1868, but 15 are included in the 1902 list, 20 sorts having been dropped out of cultivation. Of a list of 64, in 1887, 49 are included, 15 dropped, of 78 listed in 1890, 62 are included, 16 dropped. It is true that none of these earlier lists were as complete as that of 1902, but this comparison gives us an indication not only of the number of sorts in cultivation but of their lack of permanency. Now of these 321 listed varieties probably 20 or 30 were deliberate or unintentional renaming of old sorts, 40 to 80 are avowed renaming of some special

stock of old sorts in order to distinguish that stock from others of the same sort; and each one of the remainder was listed because that variety or stock proved at some time and place to be not only different but in some respects superior to any sort the observer was acquainted with. Now, do these different names stand for distinct sorts? I have been over the list pretty carefully and I do not hesitate to say that from a planting of some 25 plants of each of 25 to 30 sorts there could be selected exhibition plates of tomatoes which in the appearance of the fruits would be acceptable to the best judges as representatives of each and every one of the 321 varieties listed in the Bulletin. Now does that mean there are only 25 to 30 distinct sorts? Not necessarily. I think druggists recognize some 350 to 400 distinct medical drugs and a druggist's stock ordinarily consists of from 500 to 1000 distinct lots. I have been assured by a competent druggist that with from 50 to 75 stock solutions, crystals and powders he could fill every one of those 1000 bottles so that the best druggist in the city could not *by appearance* detect with certainty more than 5 per cent of the errors. Does this prove that there are only 50 to 75 distinct drugs instead of 1000? Or would you be willing to make use of the contents of any of the bottles so filled simply because it looked like what you wanted? I think not, you recognize that drugs which can not readily be distinguished by the eye, may have materially different qualities, and in the same way tomato fruit which can not be distinguished by the eye may differ materially in flavor, shipping and keeping qualities and otherwise or what is of greater importance to the planter, may come from plants which are radically different in habit of growth and adaptation to particular conditions of soil, climate, method of culture, etc. During the past season seed of the same lots of different varieties of tomatoes were planted in Missouri, Nebraska, Maine and Ohio, often in one of the trials every plant in a lot of 50 would have more or better fruit on it than the nearest plant in an adjoining row of another kind. You say it was a more productive sort, yes, *for that section*, but for that section only, for in many instances in the planting of the same stocks in one of the other trials every plant of the second lot would have more and better fruit than the adjacent one of the first. Often a sort, not only in trials but in large plantings will do admirably in one location, while in a different one on similar soil with seemingly the same or even better cultivation it will be a failure. Horticultural, or Wren's Egg beans do well almost universally through the northern New England states, but out of an average of 100 acres a year for 25 years, which were planted under my direction in Michigan in widely different locations and on different soils,

not over 5 per cent of the plantings made even a fair crop, and seed from successful crops in New England gave no better results than those grown in Michigan. It is difficult for one who has not had an opportunity to see how the products of the same lot of seed with the same hereditary tendencies will differ when the plants are grown in different soil, in different climate or differently cultivated, to appreciate how greatly plants vary in this respect or how much the use of seeds of sorts suited to one's particular wants and conditions will determine the satisfaction and success which will come from their cultivation. How are you to learn which of the sorts offered are best suited to your needs? You can learn a little and I am sorry to say but a little, from the seedmen's catalogues, more from the experience of others where conditions and wants are as nearly like your own as possible, but still more from planting in your own garden, seed of the most promising sorts and studying their development. I know of no way in which our Experiment Stations can be more helpful than through experiment to be best suited to conditions like their own. But your own observations of plants in your own garden will always be the best guide. Believe me, that while there is no sort which is the "best of all," superior to any other for all places and purposes, there are sorts which are better suited to your condition and wants than others and set about an earnest search for the one best suited to your particular conditions and needs. I have spoken of material things, of how we may obtain more and better tomatoes and beans, but there is something back of, and of greater importance than that. Fifty years ago as a boy living in a Massachusetts village within sight of the stone house in which Harriet Beecher Stowe lived, my heart was stirred with pity for the slaves of the South and I felt that the future prosperity and greatness of our country depended upon the prevention of the spread of slavery into our newer western states. Today I live in Washington and the pity I felt in my boyhood for the slaves of the South was not greater than that I feel today for the boys and girls who living in apartments never put foot on bare earth except possibly on a vacation day when they can go to the country. I asked one of them a few days ago where his home was and he replied, "Oh, we haven't any home, we live in an apartment." It was the *home* builders of New England and Virginia, of Ohio and Michigan, Iowa and Kansas, Dakota and Texas that have made this country what it is, and the menace to our country's future 50 years ago through the spread of slavery was as nothing compared with that which exists today through the possible decadence of the American home. The homes of the future are dependent upon the boys of today and there is no better or more

effective way to develop a boy's love of home than through the garden, not simply as a place from which the family secures tomatoes and beans through his labor, as they secure sugar and flour from the grocery store through his father's money, although this appeals to some of them, but as a place where he grows Matchless tomatoes and Golden Wax beans that beat the Success tomatoes and the Kidney Wax beans grown by the Smith boy in his garden. A boy will gladly care for Plymouth Rock chickens or a Setter dog that has taken prizes at the shows when he will neglect simple hens and dogs, and this interest in superior things does not leave him as he grows older. Many a man who would not care to spend the hours before and after business at work in raising corn and potatoes would come to enjoy the caring for and the comparison of a garden full of distinct varieties. It is for the elevation of garden vegetables from mere articles of food to objects of interest and study that I plead and I plead for it because I firmly believe that in no other way can we do more to increase the home love of the present and future generations.

Prof. Jones: The importance of developing this interest in gardening in the children, in the home and in the school, moves me to speak, at this point. I don't know that it is time to make a motion, but I wish this matter might be left with an executive committee and that prizes might be offered a year from now to the children bringing in the best exhibits from their gardens. Nothing would be of more value to this society than something of this kind for the education of the children.

W. W. Tracy: It was 40 years ago, when I first went into the employment of D. M. Ferry & Co., that I induced our State Horticultural Society to make a proposition to the pupils of the schools of the State, who would apply for it, that D. M. Ferry & Co. would send to them samples of flower seeds to be planted on the school grounds, provided they would make a report to the State Horticultural Society of the result. The fact was, that several hundred availed themselves of that privilege and received samples of seeds, which were planted on the school grounds. That custom was dropped after a year or two because D. M. Ferry & Company did not think it was prudent for them to give away seeds and at the same time sell them to merchants in the same towns. But some 6 or 8 or 10 years ago I went into a certain section of this state and I noticed that they had a good many more flowers about the houses, and I said the population must be largely German, because you all have flowers; and a

man informed me that several years before D. M. Ferry & Co. had sent the scholars a lot of flower seeds to be grown on the school grounds and that every "kid" got perfectly crazy about growing flowers and the result was, that ever since they had spent a large amount of money for flower seeds; that every year they all had to send to D. M. Ferry & Company for seeds. So the Company got their money back and more.

J. W. Clark: If you will allow me I wish to speak before your society and the college men here in relation to the breeding of plants. We all know that we have got to grow better fruits in the future than we have in the past; you have got to have a different style tree than you have had. Our trees vary in their style of growth; some are tall growing, some low, some spreading, some upright, some bear annually, some every other year. Our stations ought to take hold of the breeding of fruits and keep a record of their work, the crossing of trees of different character either in style or bearing quality, such as the crossing of a Ben Davis, for instance, with a quality of a Northern Spy or some other juicy apple and with an annual bearer, and instead of a growth 40 feet high that it will be not more than 15 or 20 feet.

COMMERCIAL FERTILIZERS IN HORTICULTURE.

J. L. HILLS.

A survey of Bulletin No. 116 of the Vermont Station issued last June, discussing in its 104 pages the commercial fertilizer trade of the State, discloses the fact that there were 137 brands of fertilizers licensed for sale in 1905. Eighty-one of these were special goods, i. e., presumedly compounded for the special uses of special crops and 56 were for general uses. Not one of the 137 brands was constructed for orchard uses. Neither the names of the goods, the claims the manufacturers make for them, their composition nor the Station analyses indicated that orchards needed attention. There were 19 different goods called corn fertilizers, 38 were dubbed potato fertilizers, 8 were designed for grain crops, 9 for grass and for oats and 6 were offered to the market gardener; but none were made for the orchardist. What then shall he do in case he thinks that his orchard needs added plant food?

There are six different lines of practice which appear open to him.

1. He may, as do most of his fellows, do nothing.
2. He may use home manurial resources.
3. He may grow and plow under cover crops as green manures.
4. He may depend upon adequate tillage.
5. He may make such selection as he can from the fertilizers that are offered him—ill adapted though they may be.
6. He may buy fertilizing crude stock and mix the goods at home.

Let us briefly discuss each of these propositions, laying particular stress upon the latter two.

Before we take up this matter, it very much needs be said that there are other things besides the depletion of the available plant food of the soil that are apt to be at fault in the orchard. Poor plans; poor site; ill adapted soils; neglected tillage; too long delayed endeavors to rehabilitate the orchard; lack of or ill-advised pruning; the growth of the orchard crop on shares, as it were, with other crops, such as grass, weeds, or sometimes beans, corn or other hoed crops; insect attacks; fungus diseases and the like; any one, several or all of these may be primary or contributory causes of unsatisfactory orchard returns; yet, when all is said, soil depletion is a common cause and well worth considering; not as a substitute for but in connection with and in addition to, other procedures.

Concerning the six procedures outlined above:

I. The "*do nothing*" policy has little to commend itself to intelligent orchardists and needs no consideration.

II. The *use of the farm manures* is justifiable, yet it must be confessed that they are ordinarily not well adapted to orchard growing. They are too nitrogenous and tend to force foliaceous growth at the expense of the maturity of the fruit. They are apt to push this growth so late into the season as to expose it to winter damage. It is usually better practice to apply these materials to other crops than the orchard.

III. *Green manuring*, using cover crops plowed under, is often worth while. Cover crops hold moisture; add humus to the soil; lessen nitrate losses; and, in many ways, are of service. If plowed under too late in the spring however, they are apt unduly to reduce the supplies of available moisture and of plant food. The green manuring proposition is too big a one to discuss thoroughly at this time. Those interested therein should get special publications on this subject from the Department of Agriculture, Washington, D. C., or elsewhere.

IV. *Tillage* is an eminently desirable proposition in the orchard. Not only as a weed killer, but as a means of freeing plant food, of conserving moisture, of promoting the aeration of the soil, and the growth therein of the beneficent forms of micro-organisms.

Before we take up the consideration of V and VI, which have to do with the purchase of commercial fertilizers, let us consider a few of the broad propositions.

Roberts some years ago showed that an orchard of thirty-five apple trees, yielding an average of fifteen bushels per tree for twenty years, removed from the soil twice the nitrogen, three times the potash and one and a half times the phosphoric acid that twenty full crops of wheat would remove. More recent investigations by other parties serve but to confirm this general statement. It would seem therefore, that if wheat needs fertilizing, apples need it yet more. The tree roots spread farther it is true than those of the wheat, yet may not on that account necessarily gain more plant food. Moreover orchard crops differ from other crops in respect to fertilization. Several years of preparatory growth of the trees without fruitage is followed by a coincident growth and fruitage. It is a continuous crop which cannot profit by the well known benefits incident to the rotation of crops.

A study of the functions and effects of various forms of deficient plant foods shows that, speaking broadly, nitrogen promotes foliaceous growth and retards maturity; that phosphoric acid, and to some extent lime, hastens maturity; and that there is a close relationship between both wood growth and sweetness of the fruit on the one hand and the use of potash on the other. Potash, particularly if not in forms other than muriate, tends to promote starch formation, and starch is the mother substance from which is formed both wood and sugar.

Now taking up propositions V and VI, the buying of commercial plant food.

V. If I were a Vermont orchardist and felt that I must buy the ready-made commercial fertilizer, I should scan the analyses in the bulletin cited at the outset of this article and search for a brand which carried medium amounts, say 2 percent, of a relatively slow form of nitrogen, and carrying relatively small proportions of nitrate nitrogen; for a brand which carried considerable amounts of a rather insoluble form of phosphoric acid which would be apt (though not surely) to indicate the use of bone; and for one carrying considerable amounts of potash. I wish such an one joy in his task. I have myself scanned the analyses of the entire lot of this year's brands and find not a single one which fills this bill, although one or two of them are

to be preferred over the others, viewed from a theoretical standpoint. As I remarked at the outset, the orchardist's needs do not appear to be met by any brand now licensed for sale in Vermont, which leads me to believe that the orchardist makes so small a call on the commercial fertilizer companies for goods of this class that it is not worth their while to license them. The orchardist who desires to use a ready made fertilizer will do well to correspond with some of the manufacturers and buy special goods direct from them for his own use. The State law does not prevent one from buying any fertilizer whether licensed or unlicensed, provided it is for his own use and not to sell to others. The Station bulletin gives a list of dealers who will quote prices and suggest brands. The Station will gladly advise any who desire further information touching these matters.

VI. It is my judgment that the orchardist who uses any material quantity of commercial fertilizers for orchard purposes may well consider the purchase of crude stock and mixing this according to his own needs. The following excerpts from bulletin 116 cited at the outset of this address give statements as to formulas.

Given a soil which is in good mechanical condition, of open texture, well drained, fairly well supplied naturally with plant food—if of limestone origin so much the better—and orcharding may be expected to succeed with less attention to fertilization than must needs be paid if success is sought on soil not thus constituted. Yet in any case, whether the soil is good, medium or poor, adequate fertilization may be expected to enhance the quality of the product as well as increase its quality.

The practice of orcharding involves continuous cropping, growing the tree for years and then growing fruit and tree at the same time. The long life of trees enable them to use relatively slow forms of plant food, but the great draft which large crops make calls for specific feeding at specific times to meet the large demand. During the growing period of trees nitrogen is particularly drawn upon; yet excess may force wood growth too late in the fall so that it does not "harden off," but winter kills. Later in the tree life soluble nitrogen tends to hinder fruit ripening.

Voorhees suggests for fruit trees in general two basic formulas: (a) equal parts by weight of ground bone, acid phosphate and muriate of potash; (b) one and a half parts of ground bone to one of muriate of potash. These would furnish on the 100-pound basis:

Ingredients	Weight	Nitrogen	Total P. A.	Avail. P. A.	Potash
Raw ground bone.....	100	3	23	8	..
Acid phosphate	100	..	15	14	..
Muriate of potash.....	100	..	..	..	50
Totals.....	300	3	38	22	50
Percentage composition.....		1.	12.7	7.3	16.7

Ingredients	Weight	Nitrogen	Total P. A.	Avail. P. A.	Potash
Raw ground bone.....	150	5	34	11	..
Muriate of potash.....	100	..	..	..	50
Totals.....	250	5	34	11	50
Percentage composition.....		2.	13.6	4.4	20.

Apples and Pears.

On poor and light soils the feeding of the trees should begin at once; on those of better grade it may not begin when the orchard is set out. At the outset on poor soils considerable nitrogen is needed, which should be of the slow type. Tankage, the rather inert and hence cheaper forms of nitrogenous crude stock, or green manuring with legumes may be resorted to. If the latter practice is employed the crop should be turned under early lest it do more harm than good. Artificial feeding on good orchard soils may commence when the trees begin to bear.

Van Slyke suggests two formulas as alternatives, the amounts used increasing as the trees grow older:

Ingredients	Weight	Nitrogen	Total P. A.	Avail. P. A.	Potash
Nitrate of soda.....	25-50	4-8	..	..	..
Dried blood	40-80	5-9	..	..	..
Acid phosphate	200-400	..	30-60	28-56	..
Muriate of potash*.....	100-200	..	..	..	50-100
Totals.....	365-730	9-17	30-60	28-56	50-100
Percentage composition.....		2.5	8.1	7.8	13.9

Ingredients	Weight	Nitrogen	Total P. A.	Avail. P. A.	Potash
Cottonseed meal	100	7	..	..	..
Raw ground bone.....	100	3	22	7	..
Acid phosphate	100	..	15	14	..
Muriate of potash.....	100	..	..	..	50
Totals.....	400	10	37	21	50
Percentage composition....		2.5	9.3	5.3	12.5

*Or one-half to one ton wood ashes.

Voorhees suggests that either of his formulas, 400 pounds to an acre, may be used on good soils when trees begin to bear, these amounts increasing as the years go on; that on medium soils the fertilization should begin earlier, and on poor soils that the second formula should be used and fortified. He further states that 1000-1500 pounds annually used with mature trees have been found to pay, enhancing quality, augmenting quantity and promoting longevity. Early spring applications, plowed in, are advised.

Grapes

Voorhees suggests 1000-2000 annually of either of his formula after bearing begins; and on light soils annually 200 pounds nitrate to promote vine growth unless green manuring with legumes is practiced. Van Slyke recommends the first apple and pear formula in double quantity, 725-1450 pounds, urges green manuring with clover, decries the use of stable manure, and states that occasionally lime may be used to advantage.

Peaches

Peach trees reach maturity quicker than do apples and the crop is apt to be a relatively larger one; hence more soluble plant food seems necessary. Voorhees states that on good soil no added plant food is needed until the third year; that on medium soils No. 2 and on poor ones No. 1, 400-600 pounds to the acre, may be used prior to setting out the orchard, to be followed by an annual application of either formula when cropping is to be expected, applied early in the season and harrowed in, together with a dressing of nitrate of soda, 100-150 pounds; acid phosphate, 200 pounds; muriate of potash, 100 pounds. He emphasizes the danger of excessive wood growth caused by late application of soluble nitrogen or early application of too much slow nitrogen as well as by green manuring.

Van Slyke's suggestions are much the same, his formula reading:

Ingredients	Weight	Nitrogen	Total P. A.	Avail. P. A.	Potash
Nitrate of soda.....	25-50	4-8	..	..	..
Dried blood	50-100	5-11	..	..	..
Cottonseed meal	100-200	7-14	..	..	..
Acid phosphate	300-600	..	45-90	42-84	..
Muriate of potash.....	120-240	..	..	..	60-120
Totals.....	595-1190	16-33	45-90	42-84	60-120
Percentage composition		2.7	7.5	7.0	10.1

Cherries and Plums.

Voorhees states that cherries and plums need essentially the treatment of peaches, that excess of nitrogen should be avoided and that occasional liming is necessary. He suggests medium applications of his second formula.

Van Slyke also lays stress on the need of lime and suggests the use of

Ingredients	Weight	Nitrogen	Total P. A.	Avail. P. A.	Potash
Nitrate of soda.....	25-50	4-8	..	..	..
Dried blood	60-120	6-13	..	..	..
Acid phosphate	250-500	..	38-75	35-70	..
Muriate of potash.....	90-180	..	..	..	45-90
Totals.....	425-850	10-21	38-75	35-70	45-90
Percentage composition		2.4	9.	8.2	10.5

As for the method of home mixing—as the mixing of fertilizing crude stock is commonly called—the apparatus and process are simplicity itself. A tight barn floor, platform scales, a shovel with a square blade, an iron rake or hoe, and a sand screen, three mesh to the inch, comprise the outfit. Weigh, screen and pulverize all materials. Nitrate of soda in particular is apt to be lumpy. If emptied on the floor, very slightly moistened and allowed to stand over night the lumps will fall apart on raking. It is advisable to specify remilled nitrate in buying. The most bulky goods (usually the acid phosphate) are spread in an oblong pile from 6 to 12 inches deep. Upon its leveled top are placed one above another the other ingredients, the resulting pile resembling a layer cake. The pile is then mixed by carefully shovelling, the shovel cutting down through all layers each time. The pile is then levelled again and the operation thrice repeated. The mixture may then be screened again if desired and stored in bulk, bags or barrels. If in good mechanical condition and in a dry place, the mixture may be kept for months before using, without deterioration.”

RESULTS OF SOME RECENT INVESTIGATIONS IN ORCHARD MANAGEMENT.

BY W. F. NYE.

In March, 1905, the Agricultural Experiment Station at Ithaca, N. Y., published in bulletin 226 the results of "An Apple Orchard Survey," of Wayne County, New York. The object of this survey was primarily for the purpose of securing such a mass of data upon certain cultural problems relating to fruit culture as to make deductions drawn therefrom of more permanent value because of the fact that they were based upon such extensive observations. The data presented in this bulletin is of such a practical nature as to have a wide application to apple culture in most apple growing sections, and is certainly very pertinent to Vermont fruit growers.

Such problems as tillage, fertilization, spraying, and distance of planting were particularly investigated as to their relation to productiveness and vigor of trees.

I. *Tillage vs. No Tillage.* Very many observations were made upon tilled and untilled orchards, and in every case a considerable increase in yield was shown in favor of the former. Ordinarily, however, the man who did not till, did not treat his orchard in other respects the same as the man who preferred tilling the orchard. To settle this question an average was made on orchards that were treated similarly in every respect, except in the matter of tillage. This question of tillage vs. no tillage is very well summed up in the following four-year average of well cared-for orchards set previous to 1880. This is an average for the entire county for the crops of 1900 to 1903 inclusive.

Tilled five years or more	271	bushels	per	acre.
Tilled most years	245	"	"	
Sod most years	206	"	"	
Sod five years or more	200	"	"	

The result of this comparison shows in the four year average an increased yield of 71 bushels per acre in favor of the tilled orchards over those in sod.

Advantages and Disadvantages of a Sod Orchard. (a) *Advantages.* There are some advantages for having the orchard in sod that are worth considering. The small stones are not brought to the surface as in the case of tillage; it is easier to haul spray rigs over; and it furnishes a good place for the apples to fall. If the trees are making sufficient growth to maintain the

vitality of the tree the sod may be all right. (b) Disadvantages. Some of the disadvantages are that it takes more manure to maintain the fertility than with tillage; the growing grass uses up moisture just when the trees need it most. The cover crop will in part serve in the same manner as the sod.

It is difficult to determine what method of treatment is best, because of the fact that it takes years before any results are reached. No treatment is good unless it looks out for the future of the orchard.

Methods of Tillage. Sometimes it is advisable to plow the orchard in the fall to save work in the spring. Early spring plowing is more desirable because the cover crop is left to hold snow during the winter, and thus prevent freezing of the roots. The ideal method is early spring plowing, followed by clean tillage till about the first of July, when the cover crop may be sown. This will furnish the so often needed humus.

Treatment of Sod Orchards. There are three general methods of treating sod orchards, viz.—that of pasturing by farm animals; by removing the hay crop; and by cutting grass and using it as a mulch. (1) Pasturing. The animals ordinarily used for this purpose are horses, cattle, sheep and hogs. Pasturing with horses or cattle is very unwise, because such animals will eat the foliage and tender shoots from the lower limbs, and in various other ways more or less damage the trees. Pasturing with sheep does no particular good or harm, although the manure dropped by them is of some value. Pasturing with hogs is the best treatment, except plowing under, that can be given sod in the orchard. Hogs receive nearly all their food from outside, and so bring plant food into the orchard. By their rooting they prevent the formation of a tough sod. An investigation of a considerable number of the sod orchards of Wayne County gave the following results:

Treatment	No. Orchards.	Acres.	Average Yield.
Pastured with hogs	22	105½	271 bush.
Pastured with sheep	15	232	216 “
Pastured with cattle	54	392	159 “
Sod, not pastured	47	256½	185 “

These figures show an average yield of 75 bushels per acre in orchards pastured with hogs over orchards that were not pastured at all. It also shows that cattle were the most harmful farm animals that can be put into an orchard.

The custom of removing hay from the orchard is nearly as bad as pasturing with cattle. The hay crop removes the plant food and moisture from the soil just at the time that the trees most need it to make their growth,

II. Fertilization.

Less than one-half of the orchards of Wayne County were found to have received enough fertilizer to be of use to them. In many cases barnyard manure was used to feed the cover crop; the trees may have obtained a little benefit from its use.

Cultivation lessens the demand for commercial fertilizers because it makes available the plant food already in the soil. Many growers say that they remove no crop from the orchard and therefore the use of fertilizers is unnecessary. Evidently they do not realize the drain made upon the soil by the growth of wood and apples. A little comparison of the apple crop with the wheat crop will show how much plant food is removed from the soil by the orchard.

		Water.	Nitrogen.	Phos. acid.	Potash.
Wheat	{ Grain	14.75%	2.36%	.89%	.61½
	{ Straw	12.56%	.56%	.12%	.51½
Apple	.....	85.30%	.13%	.01%	.19½

Or to give the results in pounds of elements removed:

Apples, leaves and wood remove from the soil:

59.39 lbs. nitrogen, 16.84 lbs. phos. acid, 80.57 lbs. potash.

The wheat crop and straw remove:

43.32 lbs. nitrogen, 13.68 lbs. phos. acid, 20.07 lbs. potash.

In other words the apple crop takes out of the soil more nitrogen and phosphoric acid and four times as much potash as does the wheat crop.

Method of Manuring. Some still spread the manure in a small circle around the tree trunk. The manure should be spread over the whole surface of the ground. If any place is to be left unfertilized let it be that same small circle around the trunk of the tree.

Cover Crops. Sometimes humus and not plant food is required by the orchard. This is very often the case in sod orchards. In 1902 only eight per cent. of the orchards in Wayne County were sown to cover crops. Quite a number of different things are used for cover crops, some of the most common being buckwheat, rye, red clover, cowpeas, alfalfa, peas and oats, and crimson clover. Red clover is admirable for this purpose on account of its being a legume, and one crop can be removed and the second turned under. On strong soils no fertilizing, except green manuring, may be needed for several years.

III. *Spraying.*

In Wayne County the method of selling the crop for the purposes of manufacturing evaporated fruits puts a premium on laxity in spraying, because the same price is given for scabby fruits that is received for good fruits. One-third of the orchards in the county were never sprayed. Forty-one per cent. received some kind of spraying in 1903.

Effect of Spraying on the Price and Yield. Sprayed orchards gave on an average an increased yield of 27 bushels per acre. This seems worth trying for. In sprayed orchards fifteen per cent. of the entire crop was barreled; in the unsprayed orchards only twelve per cent. was barreled. The average income on apples sold for evaporating was: in the sprayed orchards, \$77.84 per acre; in the unsprayed, \$63.00 per acre, making a difference of \$14.84 in favor of the sprayed orchard even when the fruit was sold for evaporating purposes.

Time for Spraying. The number of sprays must be determined by the season and the purpose. Here more than anywhere else is the old adage true, that an ounce of prevention is worth a pound of cure. In the orchard there is no cure for the various diseases, after they have once taken a foothold. All the efforts of spraying are merely to prevent the spreading of disease.

In 1904, 564 orchards were observed, and it was invariably found to be the case, that in those orchards not sprayed just after the blossoms fell, the fruit was scabby. The earlier or later sprayings did not seem to be of as much importance as this one. If three sprays are to be given, the first should be applied just before, and the second just after the blossoms fall. The next may be applied from ten to fourteen days later.

Sprays are best applied with the power sprayer. Various other kinds of sprayers, such as the hand sprayers, wheel-barrow sprayers, barrel pumps, etc., are in use but they are being gradually displaced by the power sprayer.

IV. *Distance of Planting.*

In Wayne County the apple trees are their own enemies. The early tendency was to plant too closely. Of those orchards set previous to 1880, 43% were less than 30 x 30 feet apart. Only 18% were set over 35 x 35 feet. Of the trees set since 1880 two-thirds are over 35 x 35 feet apart.

Effect of Close Planting. When the number of full grown apple trees is in excess of a certain, more or less constant, limit

of apple trees per acre, (the limit varying with different varieties), the yield is lessened directly in proportion as the number increases over the limit. The following four year average of the orchards set previous to 1880 brings out this point extremely well.

Average for the years 1900 to 1903 inclusive:

Trees not over 30 x 30 189 bushels per acre.

Trees set between 31x31 & 35x35 222 " "

Trees set between 36x36 & 40x40 229 " "

The effect, other than on the crop alone, is not shown at all by the figures. These effects are as follows: (1) The trees are ruined by the crowding, (2) the light is shut out from the lower limbs and gradually causes them to die, and (3) the bearing surface gradually approaches the ground area. For example, if trees set 30x30 are crowding the bearing surface approaches 900 square feet. If the trees are set 42 x 42 and are good mature trees having a spread of 40 feet they will leave two feet, or 30% of the ground uncovered, and have a bearing surface of approximately 4000 square feet. This is four times the area of the crowded tree. From these results two reasons present themselves for not crowding the trees, (a) they are not so healthy, and (b) the bearing surface is lessened. Perhaps the most serious injury to the crowded trees is the attempt to relieve the condition by removing the large lower limbs, which are dying. Such a procedure leaves a large place on the trunk which it cannot heal, and consequently decay starts in after a while.

The method of pruning back the top so that it will not interfere with the tree next to it is not profitable because the roots of the two trees will be likely to interfere long before the tops do.

In thinning out the trees some way needs to be selected so as to remove as many of the poor trees as possible and still leave as good looking rows as may be. This can usually be accomplished by cutting out alternate rows diagonally across the orchard. It seems a great pity to go into an orchard where the trees have been planted too close, and cut out half of the nice, vigorous growing trees, but by trampling one's feelings under foot while the thinning is being done the orchard will be very greatly benefited by the operation, although at the time it seems as if an injury were being done. If not thinned the trees would eventually kill themselves.

Reports of Committees.

Committee on Nominations: Kinney of South Hero, Vaughan of Randolph, Ballard of Montpelier.

Committee on Constitution and By-Laws: Terrill of Morrisville, Hill of South Hero, Stuart of Burlington.

REPORT OF COMMITTEE ON RESOLUTIONS.

The Vermont State Horticultural Society at its 11th annual meeting desires to place on record its appreciation of the courtesy it has received from His Honor, Mayor Burke, and the citizens of Burlington; from the railroads of the State; and from all others who have aided in making the gathering interesting and profitable. In particular it expresses thanks to the speakers who have by their aid made this one of the most valuable meetings the Society has ever held.

The Association urges upon Vermont fruit growers, both present and prospective, the desirability of concentration of effort. The apple growers especially the growing of a few varieties of high quality so handled that the fruit may reach the highest possible standard seems to offer the best prospects of satisfaction to the grower in pleasure and financial profit.

The Association repeats its recommendation of last year for a standard apple box for Vermont of 10 x 11 x 20 inches.

The Association believes that extra effort should be made to bring about cooperative work in sorting and marketing Vermont apples.

We recommend that the Executive Committee appropriate a sum not exceeding \$50 to be paid in premiums to children not exceeding 16 years of age for exhibits of fruits and vegetables at our next annual meeting.

E. HITCHCOCK,	} Committee.
T. L. KINNEY,	
G. H. TERRILL.	

Hitchcock: Following the report I would like to speak in reference to the location of our annual meetings. Several suggestions have been made; some think it would be better for the Society to secure a permanent place which would be accessible and that the meetings be held year after year in the same place; another lot thinks we can make the attempt at increasing our membership and attendance by joining with the State Grange and holding our meetings the same week with it; still others think we should move about the state from place to place with

the idea of doing more missionary work. I would like to have this matter discussed here.

Kinney: This is a very important matter, whether this Society, after the fine start it has gotten, should go about, moving from town to town, over the state for our annual meeting. The annual meeting is positive; something that we know is coming each year; and the question is whether we will leave the matter to be decided by the Secretary, who has his shoulders already burdened, or by the executive committee, or shall we here now, as a Society, say where the permanent home shall be, or whether we shall have one or not. The Society in Massachusetts, which is the largest in the country, has a permanent home; they are very wealthy and have a whole block of their own property, which they built, and they have meetings all through the season. We don't expect this, but we do think, some of us, that if we had a regular meeting place we would become so accustomed to coming together in that place, that we would be more and better able to bring our exhibits and more liable to bring more people with us and we would constantly grow better. I am very much in favor of this Society establishing itself in some town or city in Vermont, and I think Burlington is the most easy to reach for the most of us without a change of cars.

Aitkin: I can't quite agree with Mr. Kinney on that subject, because we have a very good object lesson in the Dairy-men's Association; that Society has held annual meetings for a great many years and has had no settled home. It is taken from one section of the state to another each year, and in that way we think we are doing the most good, and the result is that we get exhibits from a greater number than if we held it in one stated place. I think the best way is to leave the matter as it now is.

Kinney: There is a vast difference between an exhibition of butter and an exhibition of apples, and the shipping of same. The exhibits of butter largely are from co-operative institutions while exhibits of apples are mainly from small growers, perhaps growing not over 100 barrels a year; these are the men that have got to make these exhibits; the small men who have the big apples. I don't think the argument will hold good.

Terrill: I think Mr. Kinney is partly right, the Dairymen's Association travels from one place to another and other societies in other states do the same. If we want the meetings at Burlington we can have them there; we don't need to have a fixed rule; if that is the best place, they can be held there; we don't get the audiences in larger places that we get in the smaller ones. While we couldn't give you as large an apple exhibit at my

town as we can get at Burlington, we could fill this hall with people who are interested in the subject and the Society would be doing good. I believe that is one of the by-laws of the society, that we ought to go from place to place in the different parts of the state and encourage as many young men along horticultural lines in Vermont as we can and so increase our membership. I have thought of connecting with some other organization and as we were driven out of holding meetings with the Dairymen's Association by the Sugar Makers, I had thought of connecting with the State Grange; they have an attendance of very large numbers and a large membership roll, and if we could get such an exhibit as this before a representative of every town in the state we would be enlarging our influence.

Kinney: Surely, if there is no other member that feels as I do I will withdraw my efforts to locate this society. There is one other point,—that of tying up with some other society. Both the Dairymen's Society and the State Grange are going to be the largest and best organization in the state and in New England, and we want naturally to be in touch with them, and the nearer we can get to them the better for us.

Vaughan: My idea in regard to this matter has been something like Mr. Kinney's. Of course if there are so many others here who think it advisable to move about in the different sections of the State, I shall be willing to take a back seat, although I am in favor of locating in some place. To me the matter of having a definite date for the meeting is of more importance because that will give exhibitors a special date to look forward to and arrange for, and I feel our exhibits will be larger and better.

Aitkin: Mr. Kinney thinks if we were located we would have a bigger exhibit of fruit. At Vergennes we had a great deal better exhibition. I don't think that holds good. I think we will do far more good and interest will grow more rapidly and spread the good work throughout the state if the meetings are held in the different parts of the state.

Hitchcock: I make a motion that the matter be laid on the table.

Putnam: I for one would really like to have this society have a home and a place where its meetings will be held regularly from year to year and also have a time set; I would like to know when the meetings are to be held and where; I don't like to have two or three days' notice of the meeting and have to hurry so to get my exhibits together. Why can't the meeting be held say one year from date,—December 5-6, 1906?

Prof. Stuart: Don't you think if we fixed our date the first week in December, there would be less confusion?

Vaughan: In the by-laws of the State Grange their time is set as the second Tuesday in December, which would bring it the 11th.

Hitchcock: Motion: "That until further action is taken this organization will hold its annual meeting the first Wednesday and Thursday in December, 1906, at Burlington."

Motion carried.

REPORT OF COMMITTEE ON REVISION OF CONSTITUTION AND BY-LAWS.

Your committee recommends the following addition to Article VI "and perform such other duties as are provided in Act 15 of the 1904 laws of Vermont. For the performance of the above duties he shall receive from the Society a salary of fifty dollars (\$50.00) annually."

Respectfully submitted,
A. M. VAUGHAN, Chairman.
Committee.

Hitchcock: This committee asks that the Secretary in his call for the next annual meeting incorporate therein these proposed amendments so we will be able to vote on and adopt them a year from now.

Above made as a motion, seconded and carried.

Hitchcock: I make a motion that the treasurer be instructed to pay the sum of \$50 to the Secretary for the past year and also for the current year.

Seconded and carried.

Putnam: I for one would be very glad to vote to pay more if we could; no man could have done better work than Professor Stuart and been more faithful than he has.

REPORT OF COMMITTEE ON NOMINATIONS.

List of old officers presented and re-elected.

Hitchcock: Moved that the matter of selection of vice presidents be left with the President and Secretary with power to choose same. Motion seconded and carried.

MY METHOD OF RAISING AND HANDLING SMALL FRUIT, "STRAWBERRIES ESPECIALLY."

BY G. A. CLOUGH, EAST BRAINTREE.

First and foremost among small fruit are strawberries, and I will endeavor to give you my method of growing and handling them. First I select a piece of good ground that has been in cultivation two or three years, so as to be sure there are no eggs of the white grub in the soil, as there might be in greensward or ground that had been cultivated only one year. I plow the piece as soon as I get the corn or potatoes off and do a thorough job with the plow, pulverizing every inch as deep as possible without subsoiling, then haul and spread a heavy coat of stable manure, and if I have some more give it another application for the best crops I have ever secured were when I fertilized the heaviest. Strawberries are a gross feeder and there is nothing better than manure, and plenty of it. Now let it remain until spring for frost, snow and rains of winter to pulverize the soil and to soak the juices where the roots can get right hold of the different elements that they require. As soon as possible in the spring I put the harrow at work and stir the soil until the manure is thoroughly incorporated, then sow broadcast not more than 50 bushels of hard wood ashes per acre and then go over two or three times with the smoothing harrow. Now we have a fine mellow seed bed, and I want to emphasize this point, "do not set strawberries on loose soil." Several years ago I built me a drag or float as follows: 6 two-inch plank 7 feet long, 12 inches wide and spiked them together ship lap, then attach a chain to each forward corner and weight it down to about what the horses can handle. This is better than a roller, as it fines, firms and smoothes and leaves the land in fine shape for the plants. Now we want a marker that will mark four rows at a time. I made one and a very simple implement it is and does the work fine. Take a half-inch board 10 feet 6 inches long, that will mark four rows $3\frac{1}{2}$ feet wide, now nail four shoes or boards 4 in. wide, 18 inches long, rounded like a sled runner, 42 inches apart, attach some thills and some handles. It being light two men can draw it easily. Be sure and get the first row straight and true and then let the first marker run in the last mark and the thing is done. In setting the plants great care should be taken to get good plants, and by good plants I mean, plants that are well matured and all of last year's growth, a two or three year old plant is no good, and should never be used. I have used the spade dibble and various different tools, but the tool

that has given me the most satisfaction is the "Perfection plant setter" obtained from R. M. Kellogg, Three Rivers, Mich. Still with this tool unless the plants are fresh and good we lose some. We are very careful not to let the plants remain in the sun or exposed to the wind, for twenty minutes' exposure will kill 8 out of 10 plants; only expose them long enough to be transferred from basket to the ground and firm the earth carefully around each. I use about 7,000 plants per acre. Rows 3 feet 6 inches apart, plants 24 inches apart in the row. After setting one-half day, if the weather is dry and windy, start the cultivator and stir the ground as close up to the plant as possible without disturbing it and keep the cultivator busy every two or three days and after every rain. All summer this takes the place of irrigation and it is surprising how severe a drouth you can keep plants growing in. This is called by some "horse leg irrigation" and it is all right.

After the runners have started lay them along in the row and fasten them down with a stone or some earth over the vine, this will make them root. After you have enough placed around, cut the rest as fast as they appear and pick all blossoms off the first season. This is imperative if you want to get a big yield the following year, the plant must have all of its vigor and strength to mature a big crop of berries and the big crops are what we are after; it does not pay to go to all this trouble and expense for a small crop of small berries. This takes us up to the late fall. As soon as the ground is sufficiently frozen to hold a team, draw and cover the rows 2 or 3 inches with strawey manure and let it remain until the ground is completely thawed in the spring and you think there will not be any more hard freezes, then rake off the coarsest between the rows to serve as a mulch and also to keep the berries clean. Now there is no more to do only to pull all big weeds until picking time. See that your baskets are ordered long enough ahead so as not to be bothered in the rush of picking. I put my name on every basket of No. 1 fruit and stand behind it. Small and No. 2 berries don't need any guarantee, the berries show for themselves. I never had any trouble in disposing of a fancy lot of berries. Strawberries have long ceased to be considered a luxury, they have become a necessity. I can remember only a few years ago, less than 20, when 100 bushels of strawberries could not be sold in Randolph and vicinity throughout the season. I think I am safe in saying that more than 1,000 bushels will not fill the bill this year. Statistics show that \$100,000,000 are paid annually in the United States alone just for the little strawberry. I pay 2c per basket for picking if the picker stays through the season or 1½c if through the rush only. After the picking is

through and I want to renew the field for another year I take the disk harrow, remove the two center disks and two from each outside, now set it around as far as possible but first mow and rake the vines off and cast them away. In disking leave a row 6 inches wide and pulverize between the rows thoroughly; after this apply six or seven hundred pounds of a high grade fertilizer containing each 8 per cent of nitrogen, phosphoric acid and potash per acre. Scatter this along the row of vines left and be sure to put it on when the weather is fine and the vines dry and brush them off, as fertilizer of this strength is liable to burn the foliage. I did the same thing several years ago on vines of the first year's setting and shall always remember it as it cost me more than the price of the fertilizer. After I have the field disked and fertilized we take the hoes. Now we use a special hoe of our own which we manufacture out of an old one by cutting with a cold chisel down about $\frac{1}{2}$ way on the back, each side of the center and then horizontal with the cutting edge, making a narrow hoe about $1\frac{1}{2}$ inches wide, one of the prongs square and the other to a point. I have described it the best I know how, but I will give anyone a diagram if they wish. And I am telling you they are all right for strawberries, one man will do the work of one and a half or two men with the big hoe. There is no patent and all are at liberty to make as many as they wish. I have raised more berries on same piece, the second year after setting than the first, treated in this way. I know that there is more money in strawberries and more backaches also than anything I ever did if we make them a specialty and attend to them when they demand our attention, but if we make strawberries of secondary importance and let the weeds get the start, woe be unto us for there is no place in the world where weeds thrive and flourish as in a field of strawberries. I have taken at the rate of \$300 to \$500 per acre and much more than that for some special small pieces. The kinds that do well with me might not do with you. My favorites are the Crescent, Haverland, Glen Mary, Senator, Dunlap, Warfield, Sample, etc. I have tried a great many new varieties but I find it better to stick to my old friends than to be all the time changing to new ones.

With blackberries and raspberries I have never raised only enough for our own use, with a few to spare some years, but my intentions are to set more land to these bushes this spring as the wild ones are getting scarcer and there is more of a call for them. We commenced raising strawberries for our own use and found them so good and then the neighbors would want some and we concluded to set out more and we found by cultivating a large piece, it reduced the cost and gave us more money. My advice

is for all to set out strawberries if only enough for your own use.

While my wife and I were at the Lewis and Clark Exposition this fall at Portland, we went down through the State of Oregon and over the Siskiyou range by Mount Shasta and down the Sacramento Valley to San Francisco and thence to Los Angeles in Southern California. As I passed along I saw them setting, cultivating and picking strawberries all in the same field. They can have strawberries 8 months out of 12, but I was disappointed in the apples and peaches, they lacked the flavor of ours. The apples were coarse and punky and the peaches were sour and lacked that peachey taste. Let me say right here that if we Vermonters would cultivate, spray, thin, pick, grade, and pack as carefully as they do in the great apple sections, especially Hood River, we would soon get a reputation for our fruit that would make us hustle to supply the demand at prices that would leave a substantial margin. California, Oregon, Washington and Idaho are coming to the front with leaps and bounds. They have progressive, live, energetic and loyal men and the next 25 years will see wonderful changes all through those states, but water is to be the sesame, the door through which a large share of their greatness will come. If we Vermonters would be as loyal to our state, counties and towns as they are, we would see a great wave of prosperity sweeping over our fair state. We are not the little cold despised state that a great many would try to make us believe; there is less waste land here than most any of the states we passed through, and of our trip of over 9,000 miles this little state of Vermont was the greenest state when we went out of it September 1st and the greenest state when we returned October 31st of any state we passed through, and we came back satisfied to remain a Vermonter and raise strawberries and other small fruit.

CO-OPERATIVE APPLE CULTURE.

BY T. L. KINNEY.

Co-operation is a necessity of the times, in agricultural pursuits as well as most every other business enterprise. The high price of first class machinery as well as help makes co-operation many times a necessity on the farm. The harvesting and threshing of grain in the west compels the neighboring farmers to co-operate, as no one farmer can care for the grain as fast as it is threshed by those mammoth machines.

The immense co-operative grain elevators have been built by the farmers, whereby a double purpose is gained. First, a large amount of grain of different grades can be successfully stored under one roof, where it is ready to be loaded into cars or boats any day and in any quantity desired. Second, being held in large quantities attracts attention of the trade, and is always in the market. A new and wonderful co-operative work is now being done by the American Society of Equity, a co-operative organization for the purpose of ascertaining the amount and condition of the crop in question, and themselves setting the price on the product they have grown and are holding, instead of allowing some brokerage association to set the price on the crop they have not. Farm products have been the means of gathering up massive stores of wealth by railroad co-operation, stock exchanges, banking institutions, etc., co-operating with themselves and each other to further the end of accumulation, while the farmer, until quite recently, has been watching with a great degree of apprehension and distrust the action of his neighbor. But today, even with the farmer, co-operation seems to be the watchword. Nearly all the fruit interests of the Pacific coast are conducted through co-operative efforts in the purchase of nursery stock, of commercial fertilizers, of spraying materials, and machinery, and the spraying itself, and all the fruit product is shipped and handled by co-operative organization. Michigan and New York now have many co-operative organizations, for the handling of fruit both in its green, canned and evaporated state. The Province of Ontario has several town and district associations for handling and disposing of their fruit. There is a fruit growing stock company in Niagara district that has been in operation for twenty-five years. There is also the St. Catharines, Walkerton, Chatham, in actual successful operation, and through these co-operative efforts the Canadian fruit is called for more and more, and the prices are continually at the top.

Let us compare this successful condition with the experiences of the apple growers of the State of Maine. Both of these sections have been shipping largely across the water. Prof. Munson said at the Maine Pomological Meeting (as reported in *The New England Homestead*), "I believe as much now as ever in co-operative marketing. We are miles behind our California fruit growers in this respect. The sooner we get over our inherited Yankee tendencies to get ahead of the other fellow the better." He stated, also, that Maine apples do not hold the reputation they did three years ago. R. E. McLatchy was called and stated that, when he took hold of the apple business five years ago, Maine apples had a good reputation in foreign mar-

kets. However, largely through competition among buyers, some very poor packing was done, which resulted in the reputation of Canada and Vermont apples being very much ahead of ours. I am expecting that this fall's packing of Vermont apples will result in a similar experience with what the farmers of Maine have had. I do not think that Vermont ever sent out or allowed to go out of her state such poorly sorted and packed apples as went out this year. The prices were so high nearly every farmer was glad to sell, and the demand so great that the buyers and packers took advantage of the situation and made all the barrels they could, regardless of quality. While this kind of a deal is a benefit to the individual farmer, it is a detriment and disgrace to the state at large. The state has aided our Horticultural Society by a very generous appropriation, and it is our duty as members of this society to rectify this alarming condition of affairs, and in some good way bring about methods by which every barrel of Vermont apples that goes out of the state will be carefully handled, properly packed, thoroughly graded, and honestly marked. The color, size, and condition of the fruit in the barrel or package should be apparent from the marking, and above all Vermont apples in some form should be plainly stamped on every barrel. Where we have the recommendation of such good authority as the Pomological Society of Maine it is surely up to us as apple growers to see to it that our stock is honored with the name of the grand old state in which it was grown. The state of Oregon has a statute law compelling every grower to stamp every package which is going out of the state with the name of the state. The provinces of Canada make it necessary that every consignment of Canadian fruit before going on the market or out of the country, be inspected by legally appointed inspectors, and found to be up to the standard by which they are marked, and by the high standing of the Canadian apple on the foreign market, we can readily see the result of good work along this line. So I say to every apple producing town in the state to form a co-operative association, that we may know by the first of October or November by co-operative effort, what the apple crop is, and what a reasonable price may be for us to ask. And let us co-operate in grading and sorting, in the buying of barrels and boxes, and in storing and marketing of our fruit. The best time to sell our Vermont apples is when the market needs them, and the best storage in the world is in a Vermont atmosphere, and the only reasonable way for the small Vermont apple growers to ship in the dead of winter is by co-operative shipping. With our wonderful railroad system, fine refrigerator cars, and location midway between fifteen or twenty of the best city markets in the

world, we have the most encouraging conditions for the profitable marketing of fruit.

"POTATO CULTURE."

T. B. TERRY OF HUDSON, OHIO.

When I began growing potatoes I determined to do two things. I determined first, to grow a good many per acre,—make my land rich and get a good yield; and second, that they should be of such good quality that I could get more than the market price for them. Such things had never been done in our part of the country. I had a whole lot of trouble to get it started, but when it was once started it went all right itself.

The first thing was to grow choice potatoes,—not only so they would look nice, but so they would be good to eat,—perfect for the people who should eat them. That was not so easy to do. I had to experiment before I got it right.

I found that in order to get potatoes of about uniform grade, of just about one size,—that is what women like to cook,—not overgrown, not small, just a medium size, all alike,—I must cut the seed into one eye pieces, as we call it. That would bring failure on poor soil every time, or with poor culture, or poor, sprouted seed; but we found that with seed that had not sprouted, that were properly kept without sprouting until planting time, we could gain the results desired. I want the first sprout to grow. Those that come later are nature's efforts to preserve the species but she cannot do her best with them. The first sprout should grow, and with such seed as that, of the right variety and properly cut and put into rich soil and well taken care of. Why, I can grow more dollars to the acre from one eye cuttings than from any more seed. We have done it for more than a quarter of a century so I know what I am talking about; and still there is not an Experiment Station in the United States that won't tell you it is incorrect.

We went to work to make the matter practical and we had no trouble. I found that potatoes were sometimes green on the end, and that spoiled them. You know they are often yellow inside, and that spoils them for me; I want them snowy white. What makes this yellow? Just a little of what makes the green. Too much exposure makes the green; a little exposure makes the yellow, so we went to work to save the potatoes from ex-

posure to light from beginning to end. That meant that we could not plant potatoes in hills, unless we hilled them up high, and that is not practical, because in a hill you are going to put in considerable seed, and as they grow they are going to crack the ground open; the light will get in and you are going to have the potatoes green. So we took the one eye cuttings and planted them, one little piece about every 12 or 15 inches, three to four inches deep, instead of having a number together in a hill; they didn't crack the ground open so much and we could keep the light out better. And if there is anything on earth a potato crop needs in an ordinary summer it is water. I want the ground level, not hilled up, so the water will soak down evenly all over the ground. We are more apt to get too little than too much water. So we settled on this plan of one eye cutting, practically, and drill planting 15 inches apart and four inches deep and keeping them down in the ground. It requires drained land; we had to tile drain some. If your land was not drained you might have trouble with rot in a wet season. With our land drained we find no more trouble with rot when planted four inches deep than when planted shallow.

When I speak of one eye cutting, I think you all know practically what I mean. I don't have any iron-clad rule,—I mean to take potatoes that have the ordinary number of eyes, a medium sized tuber, and cut it so you will get one eye to a piece, in the center. At the stem end you will find a little weak one, reach up and take the next one. When you get to the seed end, there is a cluster of eyes; just take your knife and cut off the cluster of eyes and throw it away, leaving one or two eyes then on the piece. Supposing we didn't cut that off what might be the result? not always, but sometimes,—why, half a dozen eyes might start, I have often seen it; half a dozen little weak sprouts would mean 40 or 50 little potatoes and no large ones. Supposing you have that weak eye from the stem end and a poor piece from the seed end, you get about 10 good pieces and two poor ones. One-sixth of your crop is poor. That is not business.

In catering to our customers we chose varieties that would have good eating qualities. We have grown in the years past, first, the Early Rose, the Hebron Beauty, the Snowflake, and potatoes of that variety good to eat, and then we so managed to learn their habits as to grow a large crop and then grew them down in the ground so they would be white and nice when we dug them. Another thing we learned was that a really discriminating person who had a fine taste for a good potato could tell if we put fresh manure on a field. We learned to put it on a year ahead.

Then the thing was to let the people know it after we got the potatoes. That was the hardest matter of all—the day I went to Akron, our nearest city, with a bushel of potatoes,—and my wife,—she went to back me up,—and I needed it—I spent the whole day in that city and it was nearly dark before I got an order. Twenty-five cents was all I was offered; I told them we had some potatoes unlike any they ever saw; they were magnificent, of uniform size, good eating quality, and just perfect. When they were dug they were picked up immediately and covered so everything was in perfect condition and just as fresh as though they had just been taken from the ground, and they had been grown in the ground, too,—this was the Early Rose,—a good while ago, you know. I went to all the leading grocers in the city and told them I had something extra fine, and I showed them the bushel I had, and told them my price. They said potatoes were potatoes and they would not raise the price. Everywhere it was the same story. I talked and argued. Just as I was about ready to give up I came across one man who looked at the potatoes, then he looked at me and said:—“Do you pretend to say that you can bring me a load of potatoes as good as that sample?” I said “Yes, sir,” and he told me to bring them; that although he had never paid an extra price for potatoes he was willing to if they were all like the sample. I picked up my basket and started for the carriage, when he said, “I want the sample left here.” I saw the point and left the basket. The next day I got out my spring wagon,—I had had it varnished, canvas covered, etc. I piled the potatoes up to a peak in the center of the box, covered them, and just before I got to the city I uncovered them, got a pail of water and sprinkled them on top—you know potatoes look so much better when they are damp.—I left the cover off and began to drive through the streets of that city. I wish you could have seen the crowds that followed me; as I went past the dealers who had refused me the day before they came rushing out trying to buy. I told them the load was sold, that I found a man who knew a good thing when he saw it. They all asked me to bring them a load, and from that day on for fifteen years I never caught up with my orders. We got 15 cents above the market price, and for 15 years we never took less than that for a single load. That means a good deal when you raise them by the thousand bushels. It was my fixed rule to sell them at 15 cents above market price, and dealers never asked me to accept less. I was a stand-by, and they kept me going. By the way, there were thousands and thousands of Terry’s potatoes sold in Akron that Terry never raised.

I remember one year when we sold a carload of very choice potatoes to a banker in Ironton, O. He went back on

his word because a seller in Canada offered him potatoes a little less. That left me with a carload that I wanted to hurry off before the freezing weather. There was no time for me to haul them to market. I happened to know a fancy grocer in Philadelphia some 600 miles from where I live. I filled a grape basket with a sample and covered them thoroughly with dark paper and some cloth so no light could get through to them, and sent them to him to test and see if he wanted any more like them. As soon as possible came a dispatch:—"I will take all you have got."

That has been my experience; just let the people know,—some discriminating buyer, that you have got something that is A No. 1 and you will have no trouble in finding a market. I used to manage the storage of potatoes in the city myself. I had them make an absolutely dark room and I put the potatoes in there myself. From there they could be sold all during the winter in a perfectly satisfactory condition. It was a great deal more pleasure to those grocers to sell them and have people come and want more than to sell poor potatoes and hear the customers complain because of poor quality.

Of course there are many tools and methods that we have used and followed that helped. We bought one of the Aspinwall planters as soon as they came around. You can plant better by hand, but it is a good planter. If I were going into the business now I would buy a Robbins planter, still the first named planter is a good one. Then we soon found that it cost a good deal of money to dig them by hand; after a while we got hold of the Hoover; that did us good work, but if potatoes are in any degree green you must throw them out with a fork. I never did feel quite so proud as when I was seated on a digger, driving four horses, and by just manipulating two or three levers could do the work of 10 or 20 men, and a few years back I used to pay those men to do that work. It was easy, riding under a big umbrella and doing the work of that number of men,—I always believed in doing your work as easily as possible.

I had hoped one while that we would be able to get some machinery to pick up potatoes. I once went to Michigan to see a machine work, and I found it couldn't distinguish between clods, stones and potatoes. It was not practical.

One of the little devices that I got up myself was the bushel box. A bushel box had been used, but I made this special size and many thousands of them have been made and sold since. We found them very handy; the dimensions are 13 x 13 x 16 inside measurements. The ends are $\frac{5}{8}$ in. thick, $\frac{3}{8}$ in. sides and hand holes on the ends; they are very convenient to take up and hold in front of you.

We stored the potatoes on cement floors.

There are many things of that kind that I might call your attention to that anyone who grows potatoes largely will need to know to reduce the cost of production. We hear about manufacturers making so much money, such a large percentage on their investments. We never thought of making less than 200% profit on our potatoes. For every dollar invested we got \$2 profit, and we have done that for a quarter of a century.

Question: How many bushels do you grow to the acre?

Answer: We can't grow as many per acre as you can here; our climate is not as favorable, from 200 to 250 bushels of merchantable potatoes per acre. We have grown more, even up to 300 bushels and more on single acre, but that is exceptional; our average would run along year after year between 200 and 250 bushels of merchantable potatoes.

What has always seemed to me to be the most important point in the culture of potatoes—this has been my life work,—is the tillage of the crop, and particularly the tillage in a season when it is a little dry. I don't know so much about your climate, but we are troubled with drought more or less every year, almost. We have some years grown potatoes almost without rain, and other years there would be weeks at a time when it would be dry and hot. Now, the first thing that I began to study was, how to grow a crop without regard to the season. We couldn't afford to have any luck about it; we had to have a crop every year, a good big one. I have made the statement, and I believe it, that I could grow a good fair crop without a drop of rain. I could not grow 300 bushels per acre, but I could grow, I believe, 150 bushels, with the season utterly dry from the time the seed was planted to the time of maturity, and in just the way we grow all our potatoes. In the first place we have rich soil. I told you we got the soil rich enough to grow a good crop, and how we did it; rich not only in plant food but rich in vegetable matter, got it so it held the moisture,—that is a necessity in a dry summer. You have to have the vegetable matter in the soil, you get it in saving the manure, growing crops and turning them under, etc.

Question: Did you use any commercial fertilizers?

Answer: No, not at all. We got in the habit of getting along without them; we had the fertility in the soil, and gradually we built it up. When not enough rain comes from the clouds in the summer to supply a crop we have to depend on the moisture that is stored up in the spring when the rains and snows are taken in by the earth, and gradually these are thrown off to the crops. As the sun shines on the surface and the wind passes over it and takes the water away, more is supplied from beneath

to furnish the crops with what they need, else they would die. When we began growing potatoes such talk as that was called "book farming" and was all "bosh." Well, we didn't think so and we began to work along these lines. We began in the early spring, just as soon as the earth would allow us to plow. We plowed and harrowed, stirring the surface so that a mulch was formed. We kept that up,—the stirring of the surface, until the vines covered the ground and kept it moist. We would go out directly after a rain and harrow the ground and save the moisture, and we kept right at it, never allowing the surface to dry or crust. We did not stop even when the potatoes were in bloom; we took a one horse cultivator and stirred the earth until there was no space to be seen between the rows; then the plants will shade the ground. To grow one pound of weeds will take from 300 to 400 pounds of water,—so don't try to grow weeds. Potatoes can't eat the fertilizer without the water. The water passing down through the plant food dissolves it and then it is taken up by the weeds and your potatoes lose it. A man is very foolish to allow the weeds to take the water when the crops need so much of it. We have had ten acres of potatoes from which I venture to say that a man could carry in one arm the amount of weeds he could find in that piece. We kept them clean. We have done it with a smoothing harrow and a weeder, and we have done it cheaply; it doesn't cost a great deal and the results have been wonderful.

The roots of the potato do not grow right down; they run across, and when they are not cultivated shallow, the fine fibers are torn off and the plant is put to the expense of growing them over again, and nothing has been gained by such pruning. I have seen farmers riding a cultivator with a big stone also placed on the machine, weighing 50 pounds to set the teeth down good and hard and deep, when the potatoes were half grown, and they have torn off half the roots, and then they talked about poor luck. It was simply ignorance, not knowing that to tear them off they reduced the yield and particularly so if the season was dry.

This is not theory. I could give you no one idea that has put so many dollars in our pockets as this one thing.

I remember in 1881,—which was the driest year we ever had in the west,—although all through on the Atlantic coast it was not so dry, that after the potatoes were six inches high there was no rain. There were thousands of farmers in Ohio, Illinois and Indiana that did not have any potatoes to eat all that winter. There was not one single bushel of merchantable potatoes in our township so far as I know except those that grew on our farm. We sold potatoes to farmers in our township that

did not have any. We sold them to our nearest neighbor who hadn't any, and we sold them at a price that paid us a profit such as no trust or monopoly ever dared to charge. Why did we have potatoes to sell? We put into practice all these ideas I have told you of. Others said there was no such thing as science in farming. There was never a single poor season, so called, but that we made good money on our potatoes. In 1881 when we were taking in money so fast that I couldn't sleep nights, and taking it from our neighbors right around us,—my wife said, "if you will just keep still, we will get rich," but I didn't. A manufacturer wouldn't tell his neighbors about his inventions and try to teach them to be successful, but a farmer will every time, and now the farmers in our county are raising better crops of potatoes and all because they have worked along the lines I have told you of and have taken to growing clover instead of timothy, thereby enriching the soil.

When I was a boy they could raise big crops of potatoes, hundreds of bushels to the acre, the land was rich, but you can't do it now unless you learn the combination and put it into practice, and you can then grow good crops of potatoes, even without a drop of rain from the time they are planted to the time they are dug.

Question: Did you practice putting a crop of potatoes on the same land more than one year?

Answer: We did a short time, but soon stopped it; it is better not to grow them that way.

Question: If you put in clover one year is the land then in shape so that you can put another crop of potatoes on it?

Answer: Our rotation was, clover, potatoes and fall wheat, after the potatoes were dug, and then seeded to clover again, and we kept that up right around. It has proven that we grew clover a little too often. If I were to begin again I would make a four-year rotation, and put in another crop, whatever was best; I would not grow potatoes oftener than every fourth year.

Question: Would you maintain that in your experience even if you plowed the clover under for one year, that it would sustain two crops beyond, without fertilizer of some kind?

Answer: Yes,—potatoes and wheat. The clover and tillage with all the manure on the place saved, both liquid and solid, and put on the land has maintained, and more than maintained it. We took the land in its low state of cultivation and gradually built it up.

Question: Can you keep potatoes from sprouting until planting time?

Answer: Not always; I think you could always here. Our climate is more variable; we have open spells in the winter. The

best success I have had was to put the potatoes in a heap and place straw over them and then three or four inches of soil and when that froze a little, say half way through, we put another coating of straw and then sufficient earth to carry them through the winter. In that way we prevented the changes in the winter getting through to the potatoes, but a cold storage house with ice is better.

Question: You don't think they would keep in a cellar?

Answer: I have done so but it is a difficult matter. I find I can control the temperature better outdoors.

Question: Did you sow red clover?

Answer: All red clover, the common kind.

Question: Do you believe in rolling the ground after potatoes are planted?

Answer: We usually rolled it ahead of the planter if it was dry, but you want it loose; potatoes do not need a solid soil; don't roll more than necessary; we generally rolled ahead of the planter because we could mark out better.

Question: Did you ever use hen manure for potatoes?

Answer: No, simply because we kept no hens; we could make more money out of potato growing in this big way; we let the other fellow do the choring and we bought of him.

Question: What do you think is the best way for storing potatoes in a cellar?

Answer: Put them in barrels and have a platform just high enough so the air can pass under the barrels, 3 inches or so; cover the barrels with old carpets so they will be absolutely dark, and have the barrels as tight as possible; they don't need any air, and they need to be kept at as even a temperature as possible; if you can keep them at say from 33° to 36° you will succeed admirably. Potatoes won't freeze as quickly as water. I have had them stand at 28° for several days without any harm, but it is better to keep them just above freezing.

FRUIT EXHIBIT AND AWARDS.

Committee on Awards—J. W. Clark, North Hadley, Mass.
Baldwin—R. H. Bristol 1st, Luther Putnam 2nd.
Bellflower—T. L. Kinney 1st, A. H. Hill 2nd.
Bethel—Luther Putnam 1st,
Ben Davis—Luther Putnam 1st,
Fallawater—G. H. Terrill 1st,
Fameuse—T. L. Kinney 1st, Luther Putnam 2nd.
Golden Russet—, Luther Putnam 2nd.

Hubbardston—F. H. Miller 1st.
 King—Luther Putnam 1st, A. H. Hill 2nd.
 McIntosh—A. H. Hill 1st, R. H. Bristol 2nd.
 N. W. Greening—Luther Putnam 1st, R. H. Bristol 2nd.
 Northern Spy—A. H. Hill 1st, G. H. Terrill 2nd.
 Pewaukee—, Luther Putnam 2nd.
 Rhode Island Greening—R. H. Bristol 1st, T. L. Kinney 2nd.
 Rubicon—R. H. Bristol 1st,
 Scott Winter—G. H. Terrill 1st, Luther Putnam 2nd.
 Shiawassee—, Luther Putnam 2nd.
 Sutton—, Luther Putnam 2nd.
 Tinmouth—R. H. Bristol 1st,
 Tolman Sweet—Luther Putnam 1st,
 Wealthy—G. H. Terrill 1st, Luther Putnam 2nd.
 Wolf River—G. H. Terrill 1st, Luther Putnam 2nd.
 Best Collection of Apples—Luther Putnam 1st, R. H. Bristol 2nd.
 Exhibit of Apples in Packages—T. L. Kinney 1st, W. F. Holcomb 2nd, Luther Putnam 3rd.

Pears.

Anjou—A. H. Hill 1st, T. L. Kinney 2nd.
 Lawrence—, Luther Putnam 2nd.
 Committee on Awards—Profs. L. R. Jones and W. Stuart.
 Best Collection of Potatoes—Luther Putnam 1st, F. H. Miller 2nd, A. J. Eaton 3rd.

Note.—In many respects the fruit exhibit was disappointing. The display as a whole was not as large or of as high quality as at preceding meetings. The smallness of the exhibit was doubtless due to a less abundant crop and to high prices prevailing for high quality fruit. The potato exhibit though a new feature in the Society brought out a very creditable display; that of Mr. Luther Putnam being particularly deserving of praise. [Secretary.]

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